Vol. VI, No. 3 MARCH, 1951

AGRICULTURAL CHEMICALS

In This Issue:

Fertilizers and Pesticides in Israel's Agriculture

•

Resume of Fruit Fungicides

•

Relationship of Nitrogen and Fertilizer Prices

•

New Method for Impregnating DDT-BHC Dusts

•

Hazards of Insecticide Application

•

Diagnosing 2, 4-D Injury in Trees

killing power

...THE KIND THAT PAYS!

Insecticides which meet only *minimum* standards may fail miserably under field conditions.

To protect you against such eventualities, all POWCO BRAND manufacturing formulae include overages...extra tolerances for extra quality.

This is your assurance of full-measure effectiveness in your finished formulations.

John Powell & Co., Inc.

ONE PARK AVENUE, NEW YORK 16, N. Y.

Sales Offices: Philadelphia • Pittsburgh • Huntsville • Chicago • Fort Worth • Denver • San Francisco
Canada: Charles Albert Smith, Ltd., Toronto, Montreal • Argentina: John Powell y Cia
Representatives in Principal Cities of the World

ALLETHRIN • DDT • CHLORDANE • PYRETHRUM & PYRIN • PIPERONYL BUTOXIDE
ROTENONE • SABADILLA • ANTU • 2,4-D & 2,4,5-T • BHC • LINDANE • TOXAPHENE

IMPORTANT NOTICE

On and after April 15th our General Sales Office will be located at the following new address

1625 EYE Street, N. W.
Washington, 6, D. C.
Telephone: STERLING 4990

Our New York office will be discontinued as of the above date.

POTASH COMPANY OF AMERICA
Carlsbad, New Mexico

GENERAL SALES OFFICE . . . 50 Broadway, New York, N. Y.
MIDWESTERN SALES OFFICE . . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . . Candler Building, Atlanta, Ga.

ATTACLAY "reasons why"
Fifth of a series

IF CHLORDANE IS IN YOUR PLANS

...know the inside story about ATTACLAY®

The story really started in the years BC (before chlordane), during which time Attaclay built up an impressive record as carrier and diluent in primary formulations utilizing DDT, nicotine, and BHC. Came 1947, chlordane was taken in stride and added to the list. Today, we estimate that better than five-sixths of the technical chlordane going into dust concentrates and wettable powders is formulated with Attaclay.

Attaclay has what highly viscous chlordane needs—great sorptive capacity and over-all efficiency. That's why a 40% base on Attaclay is still a dry, free-flowing powder—readily handled in the plant, highly acceptable to blenders. It's also why chlordane processors rely on Attaclay to help them turn out more of a better product at greater efficiency per carrier dollar.

It will be a source of satisfaction in '51 to know that Attaclay will be co-host with chlordane to countless grasshoppers, and insects that infest fruit, cotton, live stock, and the soil. It's another example of the contributory job Attaclay is doing with *all* the popular poisons—and for a large majority of agricultural chemical producers.

May we work with you?

DUSTS VS. SPRAYS

You get better coverage of row crops—especially on undersurfaces of mature plants—when you apply dusts.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.

AGRICULTURAL CHEMICALS

THIS MONTH'S COVER

Both insecticides and fertilizers are playing an important part in the agricultural rehabilitation of Israel. Here DDT is being sprayed in vineyard for control of insect pests. (See article on page 38)

VOL. VI No. 3
MARCH 1951

In This Issue:

Editorials 31
Modern Insecticides 32
By S. S. Sharp
Agricultural Revolution in Israel 38
By Ernest Stock
Herbicide Damage to Shade Trees 42
World Pesticide Consumption (Part II) 44
By Laura G. Arrington
Relationship of Nitrogen and Fertilizer Prices (Part II) 49
By A. L. Mehring and G. A. Bennett
Insecticide Application Hazards 53
By Dr. Julius M. Coon
Midwest Shade Tree Conference Meets 57
By H. H. Slawson
Industry News 75
Meeting Calendar 77
Washington Report 83
Suppliers Bulletins 93
Technical Briefs 95
Industry Patents 99
Book Reviews 103
Classified Advertising 127
Tale Ends 130

A Monthly Magazine For the Trade

•

LAWRENCE A. LONG
Editor

THOMAS MORGAN
Advertising Manager

•

Editorial Advisory Board . . .

DR. ALVIN J. COX
Palo Alto, Calif.

LEA S. HITCHNER
Washington, D. C.

DR. S. E. A. MCCALLAN
Yonkers, N. Y.

DR. CHARLES E. PALM
Ithaca, N. Y.

DR. COLIN W. WHITTAKER
Washington, D. C.

AGRICULTURAL CHEMICALS

Subscription Rates: *One year, United States, $3.00; Canada and Pan American countries, $4.00; Foreign, $5.00. Published monthly on the 15th by Industry Publications, Inc. Wayne E. Dorland, President; Ira P. MacNair, Secretary-Treasurer. Publication office, 123 Market Place, Baltimore 2, Md. Advertising and editorial office 254 W. 31st St., New York 1, New York — Chicago Office, 333 N. Michigan Blvd. Advertising rates made known on application. Closing date for copy — 20th of the month previous to date of issue.*

Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

TWO EFFECTIVE BOTANICALS

ROTENONE

for

A WIDE VARIETY OF
VEGETABLE AND
LIVESTOCK INSECTS

RYANIA

for

EUROPEAN CORN BORER
SUGAR CANE BORER
CRANBERRY FRUIT WORM

NO APPLICATION HAZARDS
NO RESIDUE PROBLEMS

THE WORLD'S LARGEST BOTANICAL DRUG HOUSE

S. B. PENICK & COMPANY

50 CHURCH STREET NEW YORK 7 N Y
Telephone COrtlandt 7-1970

735 WEST DIVISION STREET CHICAGO 10 ILL
Telephone MOHawk 5651

FOR HIGHER ANALYSIS,
LOWER COST PLANT FOODS

Use

FERTILIZER BORATE, HIGH GRADE

(The Low Cost Fertilizer Grade Borate)

1 Developed especially for fertilizer use to supply the essential plant food element BORON.

2 Fertilizer Borate, High Grade, offers a more economical source since it contains 21% more Borax than Fine Granular Borax.
(82.9 lbs. Fertilizer Borate High Grade equivalent to 100 lbs. Borax.)

3 Technical services, literature and quotations on request. Address your inquiry to nearest office.

PACIFIC COAST BORAX CO.

Division of Borax Consolidated, Limited

NEW YORK • CHICAGO • LOS ANGELES

Agricultural Offices:

536 Prospect Ave., Beaver Dam, Wisc. First National Bank Bldg., Auburn, Ala.

MANUFACTURERS OF THE FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS ®

Hard Water?

Hard or Soft . . .
Cold or Hot . . .
water mixes readily with insecticide concentrates made with Atlas emulsifiers!

If you're trying to make a *versatile* concentrate—one that can be diluted with any type of water, even sea water—Atlas emulsifiers can most likely do the trick for you, regardless of the types of toxicants and solvents you're using.

Or, maybe you want a really outstanding insecticide or weed-killer concentrate for a special set of conditions. There, too, Atlas emulsifiers can fill the bill for you.

Using Atlas emulsifiers, you can avoid troubles with emulsions that "break" or precipitate salts or scum with hard water, or form objectionably "tight" emulsions in soft water. Your concentrates can be made to mix uniformly with water with little agitation. They can be stable at low temperatures and through long storage.

For valuable information on the use of Atlas emulsifiers in the formulation of insecticide and herbicide concentrates, write for the *free* new 24-page booklet "Atlox Surface Active Agents for Formulating Agricultural Chemicals." It shows typical formulations with DDT, chlordane, toxaphene, aldrin, benzene hexachloride, dieldrin, 2,4-D, 2,4,5-T and many other toxicants, plus a new precise method of testing and evaluating emulsions.

Atlox: Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

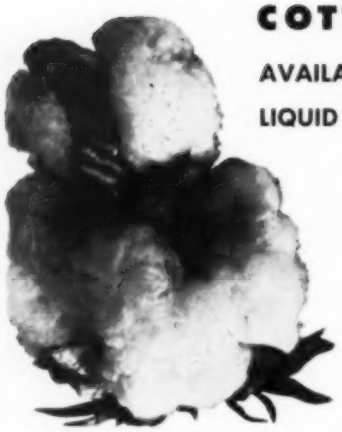
CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*
ATLAS POWDER COMPANY, CANADA, LTD., Brantford, Canada

This eight page section
is devoted exclusively
to the one hundred
fifty-three Colorado .44 Brand
products of the
Chemical Corporation
of Colorado

153 items you can for your 1951

COTTON POISONS



AVAILABLE IN DUSTS AND LIQUID FORMULATIONS

- 44 Aldrin
- 44 Dieldrin
- 44 Toxaphene
- 44 Benzene Hexachloride
- 44 Chlordane

Formulated in any combinations to suit the recommendations of yourself, your customers and your county agent.

CATTLE SPRAYS

- 44 Gold Star Livestock and Barn Concentrate
- 44 Stock and Barn Insect Killer
- 44 Dairy Spray
- 44 Grub Dust
- 44 Ben-Hex 10
- 44 Sheep Dust

BRUSH KILLERS

- 44 Brush Murder (2,4-D and 2,4,5-T)
- 44 Hi-Strength Brush Murder
- 44 2,4,5-T Concentrate

TOXAPHENE

- 44 Emulsifiable Toxaphene Concentrate
- 44 Super Toxaphene Concentrate
- 44 Toxaphene Oil Concentrate
- 44 Cotton Dust 20-40
- 44 10% Toxaphene Dust
- 44 20% Toxaphene Dust
- 44 Wettable Toxaphene Powder

WHEAT CHEMICALS

- 44 2,4-D Weed Killers
- Toxaphene Emulsifiable Concentrates and Dusts
- 44 Chlordane Emulsifiable Concentrates and Dusts
- 44 Parathion Emulsifiable Concentrates and Dusts
- 44 Tepptone Emulsifiable Concentrates and Dusts

CORN INSECTICIDES

- 44 25% DDT Emulsion Concentrate
- 44 DDT Wettable Powder
- 44 Parathion Emulsifiable Concentrate
- 44 Tepptone Emulsifiable Concentrate and Dusts

select from stock... buy now!

HOUSEHOLD SPRAYS

- 44 Kilzit (Containing Chlordane)

Available in pints, quarts, gallons, 5-gal. pails, 30 and 55 gal. drums. A 2% Chlordane in refined oil base.

CHLORDANE PRODUCTS

- 44 Emulsifiable Chlordane Concentrate
- 44 Super Chlordane Concentrate
- 44 Chlordane Oil Concentrate
- 44 5% Chlordane Dust
- 44 Wettable Dust Concentrate

DDT PRODUCTS

- 44 25% DDT Emulsion Concentrate
- 44 DDT Wettable Powder
- 44 DDT Dust Concentrate
- 44 DDT Cotton Dust 3-5-40
- 44 5% DDT Dust
- 44 Potato Dust 5-90
- 44 Potato Dust 10-80

COLORADO 44 BRAND

CHEMICAL CORPORATION OF COLORADO

GARDEN INSECTICIDES

- 44 Octakill
- 44 Emulsifiable Concentrate
- 44 Chlordane Dust

2,4-D PRODUCTS

- 44 2,4-D Weed Killer Liquid Amine Concentrate
- 44 Butyl Ester 2,4-D
- 44 Isopropyl Ester 2,4-D
- 44 Aero Butyl Ester
- 44 Super "80" Butyl Ester

MAIL THIS COUPON

Rush price list and full information on all Colorado •44 products

NAME_____

ADDRESS_____

CITY_____ STATE_____

Colorado

.44 PARATHION

kills the green bug... makes your profits and the farmer's income greater

Recommend Colorado .44 Parathion—the versatile insect killer. Kills corn borer, aphids, grasshopper, armyworm, and the greenbug in wheat and all small grains. Phone, wire or write today to learn about Colorado .44 Parathion.

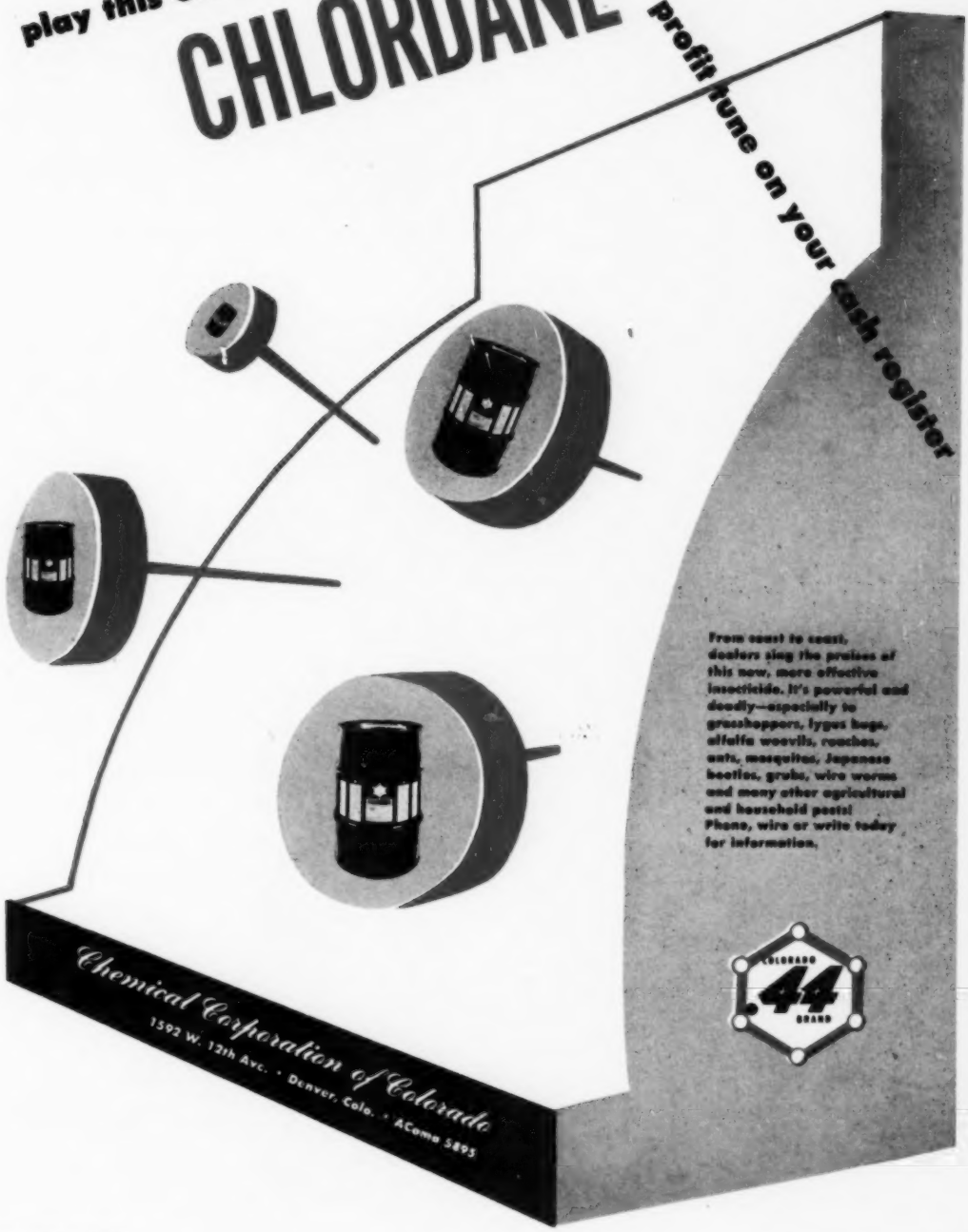
CHEMICAL CORPORATION OF COLO.
1592 W. 12TH AVENUE
DENVER, COLO.

AComa 5895

play this Colorado .44

CHLORDANE

Profit tune on your cash register



From coast to coast, dealers sing the praises of this new, more effective insecticide. It's powerful and deadly—especially to grasshoppers, lygus bugs, alfalfa weevils, roaches, ants, mosquitos, Japanese beetles, grubs, wire worms and many other agricultural and household pests! Phone, wire or write today for information.

COLORADO 44 BRAND

Chemical Corporation of Colorado

1592 W. 12th Ave. • Denver, Colo. • AComa 5893

You can start harvesting now!

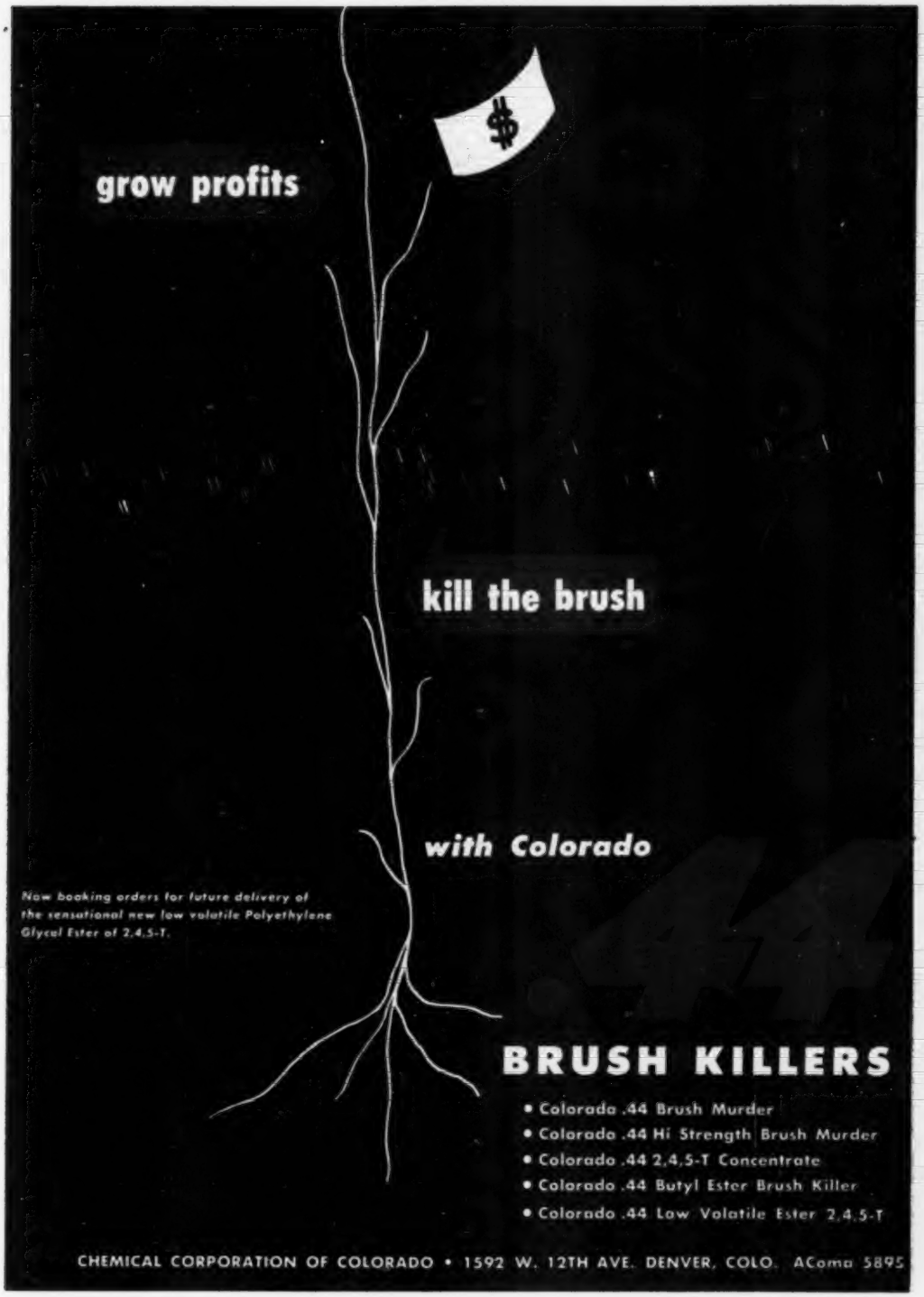
Colorado .44 Weed Killers are available in many formulations, in a complete range of sizes. Phone, wire or write today for full information.

Sell Colorado .44 Weed Killers

- Colorado .44 Amine of 2,4-D
- Colorado .44 Butyl Ester of 2,4-D
- Colorado .44 Isopropyl Ester of 2,4-D

COMPLETE STOCKS AVAILABLE FOR IMMEDIATE SHIPMENT

CHEMICAL CORPORATION OF COLORADO • 1592 W. 12TH AVE. • DENVER, COLO. • AComa 5895


grow profits
kill the brush
with Colorado
Now booking orders for future delivery of the sensational new low volatile Polyethylene Glycol Ester of 2,4,5-T.
BRUSH KILLERS
• Colorado .44 Brush Murder
• Colorado .44 Hi Strength Brush Murder
• Colorado .44 2,4,5-T Concentrate
• Colorado .44 Butyl Ester Brush Killer
• Colorado .44 Low Volatile Ester 2,4,5-T
CHEMICAL CORPORATION OF COLORADO • 1592 W. 12TH AVE. DENVER, COLO. AComa 5895

COLORADO .44

ALDRIN

KILLS COTTON INSECTS

COLORADO .44 COMBINATIONS OF ALDRIN & OTHER INSECTICIDES ARE AVAILABLE

Never before such a fast killing, versatile insecticide as Colorado .44 Aldrin! Colorado .44 Aldrin with Toxaphene or DDT gets rid of Boll Weevils, Plant Bugs, Cotton Fleahoppers, Thrips, Cutworms, Grasshoppers and other insects in cotton more thoroughly than any other insecticide. Yet it costs LESS to use Colorado .44 Aldrin because extremely low dosages are required for many types of insect control. Besides cotton insects, Colorado .44 Aldrin may be used by itself or in combination with Colorado .44 DDT, Chlordane, and others for quick elimination of other destructive pests on non-forage crops. Available in emulsifiable concentrates, wettable powders and dusts.

Colorado .44 offers MORE COMPLETE crop protection

Colorado .44 Chlordane. Recommended by the U.S.D.A. for control of grasshoppers.

Colorado .44 Toxaphene. Finest formulations in the country! Gives maximum control over hard-to-kill insects.

Colorado .44 DDT. Effective in concentrated form or in combination with other insecticides.

Colorado .44 2,4-D, 2,4,5-T Weed Killers. Available as Amine, Butyl Ester Isopropyl Ester forms.

STRICT LABORATORY CONTROLS RESULT IN FINER EMULSIFICATIONS AND MIXES GIVING GREATER KILLING POWER

EARN MORE THAN EVER BEFORE!

BUY COLORADO .44!

Canada chooses Aldrin for control of grasshoppers. Over 2,000,000 acres of crop and range land were treated this year for control of grasshoppers using 2 OUNCES OF ALDRIN TO THE ACRE. This performance establishes a new record for effectiveness and economy in controlling grasshoppers.

WIRE, WRITE, OR PHONE FOR FURTHER INFORMATION ON ALL COLORADO .44 PRODUCTS!

CHEMICAL CORP. OF COLORADO

1592 W. 12th Ave. Denver 4, Colorado

CHEMICAL CORPORATION OF COLORADO
1592 W. 12th AVE.
DENVER, COLO.

Tell me how the following insects can be killed faster and more profitably with Aldrin:

.....

.....

Name .....

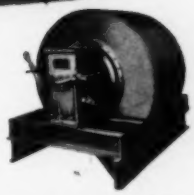
Address .....

City ..... State .....

You Can Cut Today's High Production Costs with STURTEVANT EQUIPMENT

AIR SEPARATOR

For separation of fines to 325 mesh and finer. Increases output from 25% to 300% . . . lowers power costs by 50%. For years, this separator has been the standard in the cement industry.



DUSTLESS BLENDER

Four-way mixing action assures a thoroughly blended product. Open-door accessibility permits easy cleaning. Available in many mixing capacities for ¼ ton per hour and up.

RING-ROLL MILLS

For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open-door accessibility. Many sizes. No scrapers, plows, pushers, or shields.

SWING-SLEDGE MILLS

For coarse and medium reduction (1" to 20 mesh). Open-door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

JAW CRUSHERS

For coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

Sturtevant equipment, such as illustrated, helps you overcome high labor and production costs by increasing output. In addition, their rugged construction assures long life with minimum maintenance. It will pay you to investigate these machines. Write for information.

STURTEVANT MILL COMPANY
123A CLAYTON STREET, BOSTON 22, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS
CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

MAIL COUPON TODAY!

STURTEVANT MILL COMPANY
123A Clayton Street, Boston 22, Mass.

Gentlemen:
Please send me your catalog. I am especially interested in _____

Name _____

Street _____

City & State _____

Basic Agricultural Chemicals of Quality...

KOLKER

DDT — **DDT Insecticides**
100% technical grade
Wettable Powders
Dust Concentrates
Emulsifiable Solutions

BHC — **BHC Insecticides**
Technical grade (36% gamma)
12% gamma Concentrates

2,4-D — **2,4-D Weed Killers**
Acid
Sodium Salt
Butyl Ester
Isopropyl Ester
Ester and Amine salt solutions

2,4,5-T — **2,4,5-T Brush Killers**
Isopropyl and Butyl Esters

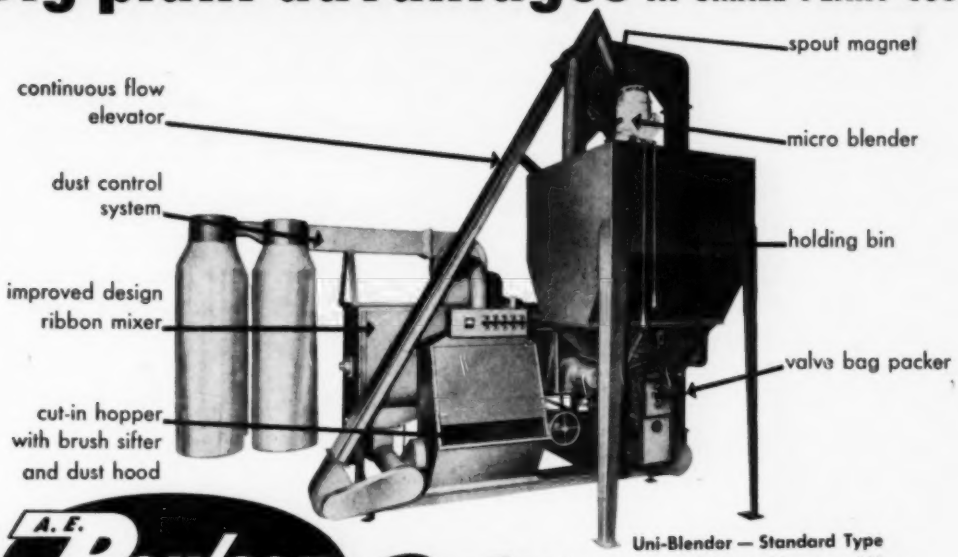
Plants in
NEWARK, N. J.
and HOUSTON, TEXAS

Friendly technical assistance . . .
strict quality control . . .
on-the-dot shipments . . .
these are a few of the reasons why Kolker has become one of America's leading manufacturers of agricultural chemicals.
You are urged to call or write today for 1951 deliveries.

Kolker Chemical Works Inc.
80 LISTER AVENUE, NEWARK 5, N. J.
Manufacturers of Agricultural Chemicals

FOR ALL PROCESSES OF INSECTICIDE PRODUCTION

Big plant advantages AT SMALL PLANT COST



Uni-Blendor — Standard Type
COMPLETE... nothing to add!

A. E. Poulsen & COMPANY

R.T.R.* UNI-BLENDOR

PATENT APPLIED FOR

The R.T.R. UNI-BLENDOR incorporates all of the advantages of individually designed plants at materially lower cost. The units are designed by engineers who are recognized specialists upon insecticide processing equipment. A type is manufactured for each process of production.

R.T.R. UNI-BLENDOR — Standard Type... Engineered to mix and blend dust concentrates with diluents to produce finished field-strength products of consistently uniform quality. Requiring only 9'x12' of floor space and 13' of head room, the equipment can be readily and immediately installed in most existing buildings. The Uni-Blendor Standard Type produces up to four 40 cu. ft. batches per hour.

R.T.R. UNI-BLENDOR—Hi-Capacity Type... Designed for the same production process as the R.T.R. Uni-Blendor Standard Type, and producing up to seven 40 cu. ft. batches per hour, is provided for operations requiring quantity production.

R.T.R. UNI-BLENDOR — Dual Type... Engineered to perform a dual function — the formulation of dust concentrates from technical grade toxicants and also the production of finished field-strength products.

Ready to Run... *and ready to earn

Each type of R.T.R. Uni-Blendor is a complete, compact, Ready to Run plant — nothing to add. Each unit is plant tested before shipment to assure maximum efficiency and trouble free performance.

The R.T.R. Uni-Blendor reduces the investment in equipment, eliminates the expense of remodeling buildings, avoids delays of installation, avoids disappointments in operation and production — all of which are frequently involved in individually designed equipment. Shipped in sections which any mechanic can assemble, the R.T.R. Uni-Blendor is ready to operate profitably, immediately after the electrical system is connected to the plant circuit.

A. E. POULSEN & CO.
Established 1939
Conveying and Processing Machinery
2025 SAN FERNANDO ROAD, LOS ANGELES 65, CALIF.
Phone CApitol 1-3134

A. E. POULSEN & CO. DEPT. 3
2025 San Fernando Road
Los Angeles 65, Calif.

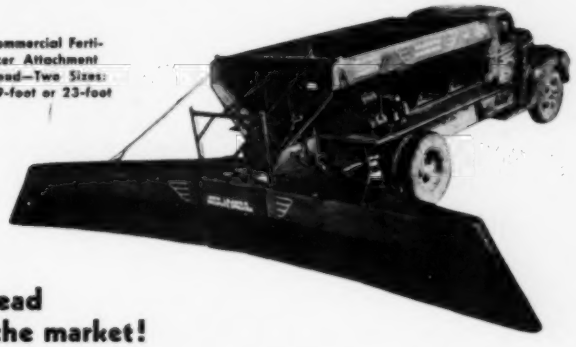
Please send me more information on Uni-Blendor
☐ Standard ☐ Hi-Capacity ☐ Dual

Name.....
Firm Name.....
Street Address.....
City.....Zone.....State.....

Improve
your insecticide
with
Alcoa Cryolite
Alcoa Cryolite is a standard, high-power insecticide, approved by state experiment stations. It is compatible with insoluble-type copper compounds, sulphur and other neutral fungicides, insecticides and diluents. Its properties are dependable and can help make your insecticide better.
Here's how—
Alcoa Cryolite is Selective. Kills harmful, chewing insects, but has no appreciable effect on bees and other beneficial insects. Does not kill birds or other wild life.
Alcoa Cryolite is Safe. Does not affect soil balance. Safe on delicate foliage. Not acutely poisonous to humans.
Particle size is Uniformly-controlled. Just right for maximum, even coverage. High suspendability in spray tank. Free dusting and spraying.
Particles are Smooth. Negligible abrasive effect on equipment. No jagged edges, because particles are not formed by crushing.
READILY AVAILABLE FROM LARGE STOCKS
Alcoa Chemicals
ALUMINAS and FLUORIDES
ACTIVATED ALUMINAS • CALCINED ALUMINAS • HYDRATED ALUMINAS • TABULAR ALUMINAS • LOW SODA ALUMINAS
ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE • GALLIUM
THESE DISTRIBUTORS CAN SUPPLY YOU WITH ALCOA CRYOLITE
CALIFORNIA-SPRAY CHEMICAL CORP.
Richmond, California
E. I. DUPONT de NEMOURS & CO.
Grasselli Chemicals Department
Wilmington, Delaware
CHIPMAN CHEMICAL COMPANY
Bound Brook, New Jersey
NIAGARA CHEMICAL DIVISION
Food Machinery & Chemical Corporation
Middleport, New York
For further information write to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 641 Gulf Bldg., Pittsburgh 19, Pennsylvania.

HERE'S THE ANSWER TO YOUR SPREADING PROBLEMS!

AGAIN! "The NEW LEADER" leads the field



Commercial Fertilizer Attachment Head—Two Sizes: 19-foot or 23-foot

with its new "Motor-Driven Spreader" offering greater accuracy of spread with the most positive feed on the market!

SPECIAL ADVANTAGES — Uniformity of spread is not dependent on truck speed. Motor is mounted on catwalk and drives only the twin distributor discs at a constant speed, assuring full width of spread at all times together with uniform distribution.

Conveyor is separately driven from truck drive shaft by a series of V-belts to deliver the correct amount per acre—regardless of truck speed or regardless of whether the truck is driven in low, super-low or any other gear.

Conveyor speed is, therefore, positively synchronized with speed of the rear wheels of the truck and at each revolution of the rear wheels, the conveyor moves a given distance regardless of the truck's speed. Amount of material delivered by conveyor does not vary with hilly or soft field conditions.

Spreader Body Lengths (inside measure) are 9′, 11′, 13′ and 15′. Other body lengths on special order.

Note: When Spreading Attachment is folded up for road-traveling position, width is approximately 7′-5″.

"The NEW LEADER" Self-Unloading Bulk Transport

The 20-ton capacity transport above is shown with elevator in place and ready to load a NEW LEADER Spreader truck. These units are proving very profitable; in bad weather they eliminate demurrage on railroad cars; fertilizer gets to the job quickly and spreader trucks can be kept working in the field. The transport, being a self-unloading unit, leaves the tractor truck free to return to pick up another transport load. These units have four individual compartments of 5 tons each. Each compartment may be unloaded independently of the others. Compartments and rear endgate are removable so that bagged and packaged goods may be hauled instead of bulk loads. Capacity 5 tons to 25 tons, lengths from 11 ft. to 40 ft. Written warranty with all NEW LEADER equipment. Write today for specifications, prices, etc. Fast delivery service sells fertilizer!

FREE! Write for "The Story of a Custom Fertilizer Spreading Service"

HIGHWAY EQUIPMENT COMPANY, INC. CEDAR RAPIDS, IOWA

MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS

Phillips is a Dependable Source of Nitrogen!

AMMONIUM SULFATE

Phillips 66 Ammonium Sulfate is a free-flowing 21% nitrogen material! Mixes easily! Uniform crystals resist caking! Ideal for high analysis mixed goods! A fine direct application material, too!

AMMONIUM NITRATE

Phillips 66 Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Depend on Phillips 66 Prilled Ammonium Nitrate for uniform, free-flowing properties and top-notch crop response.

NITROGEN SOLUTIONS

Get more N per dollar! Phillips 66 Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low! Promote rapid, thorough curing!

ANHYDROUS AMMONIA

Tank car shipments of Anhydrous Ammonia (82% nitrogen) are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle. Write our nearest district office for full information.

PHILLIPS CHEMICAL COMPANY

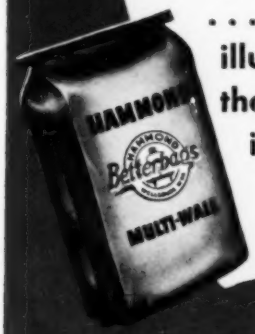
A Subsidiary of Phillips Petroleum Company

FERTILIZER SALES DIVISION • BARTLESVILLE, OKLAHOMA

DISTRICT SALES OFFICES:

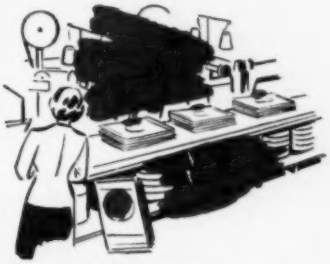
NORFOLK—610 Royster Bldg. • TAMPA—305 Morgan Street • HOUSTON—423 Commerce Bldg. Addition • OMAHA—WOW Building
AMARILLO—First National Bank Bldg. • LOS ANGELES—4521 Produce Plaza West • BARTLESVILLE—Adams Building

Behind HAMMOND *Multi-Wall* BAGS

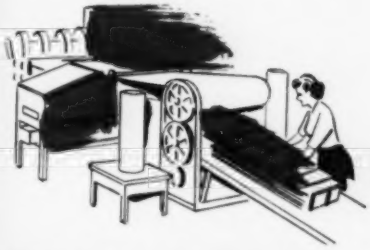


. . . are the features illustrated plus a thorough understanding of your shipping bag requirements

★ HIGHEST QUALITY PAPERS AND MATERIALS



★ PLANT EFFICIENCY



★ MODERN MACHINERY

★ PRIDE OF WORKMANSHIP

The preference for Hammond Multi-Wall Bags continues to grow steadily because of an ever-increasing list of satisfied customers in every industry where Multi-Wall Bags are used. Highest quality papers—efficiently handled by thoroughly trained, competent and conscientious personnel—using modern methods and high-speed machines are just a few of the many reasons why Hammond Multi-Walls are specified for safe, dependable shipment of cement, flour, fertilizers, chemicals, plaster, insulating materials, potatoes, feed and hundreds of other products.

Write today for your copy of our booklet—
"To Serve You Better with Hammond Multi-Wall Bags"

HAMMOND BAG & PAPER CO.

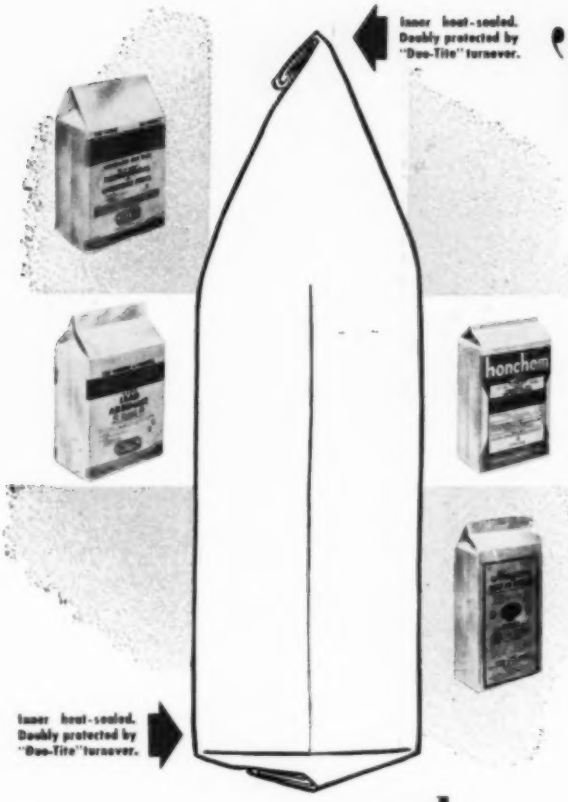
General Offices: Wellsburg, W. Va.

Plants in Wellsburg, W. Va. and Pine Bluff, Ark.

Representatives in the following cities:

Chicago, Ill. Minneapolis, Minn. New York, N.Y. Rhinelander, Wis.
Philadelphia, Pa. Columbus, Ohio Charleston, S.C. Uniontown, Pa.
Houston, Texas Kansas City, Mo. Baltimore, Md.

Positively will not permit ***SIFTING***


Inner heat-sealed. Doubly protected by "Duo-Tite" turnover.
honchem
Inner heat-sealed. Doubly protected by "Duo-Tite" turnover.

"Duo-Tite" Bag

FOR POWDERED CHEMICALS

If there is any bag that positively won't permit dry particles to sift, this is it! Betner's new method of construction combines special liners with folding, gluing and heat-sealing in such a way that there is virtually "No Sift" for contents. This new Betner bag is perfect for insecticides, fertilizers and other chemicals that must be packaged in sift proof containers. It is also ideally suited for packaging foods. Available in sizes holding from 1 to 25 lbs. of bulk powdered material; can be pre-printed up to four colors; and can be made in several combinations of materials.

and...

Betner can supply the special machinery for closing the "Duo-Tite" bag . . . it heat-seals, double folds and pastes the tops in exactly the same manner as the bottom is constructed.

A complete bag service...

from idea to finished bag to machinery for closing bags and filling and closing liner bags for cartons. Your inquiries are welcome, and samples with full technical information will be supplied promptly.

Benj C Betner Co DEVON, PA.

BENJ. C. BETNER CO. of VA., Richmond, Va.; BENJ. C. BETNER CO., of WISCONSIN, Appleton, Wisconsin; BENJ. C. BETNER CO., Paris, Texas; BENJ. C. BETNER CO. of CALIFORNIA, Los Angeles, California; Southern Packaging Corporation, Affiliate of BENJ. C. BETNER CO.

Your choice of formulations... when you use

HI-GAM® 99

LINDANE

PRODUCT INFORMATION

Pennsalt Hi-Gam 99 (lindane)

Description: Technically pure lindane containing 99% or more gamma isomer of BHC.

Form: Fine, white, hard crystalline particles.

Melting Point: Approx. 112° C. (pure gamma isomer of BHC).

Shipped in convenient 10, 25 and 50 lb. containers.

SOLUBILITIES (Approx.) in some Typical Solvents.

Solvent	% lindane by weight (room temp.)
Cyclohexanone	40-50
Mesityl oxide	35
n-Butyl acetate	30
Xylene	25
Isophorone	25
Diesel oil	4
Kerosene	2
White oil	2

With Pennsalt Hi-Gam 99 you get lindane in technically pure, easy-to-handle form. This fine crystalline material can be compounded into the formulations your customers want most. Hi-Gam 99 lindane offers the "punch" of BHC without the excess bulk or penetrating odor.

And for suppliers not equipped to handle technical materials, Pennsalt offers these two popular lindane formulations:

Pennsalt Hi-Gam W-25

Wettable powder containing 25% lindane. Recommended for control of: certain insect pests on livestock; flies in dairy barns; and many truck crop pests.

Pennsalt Hi-Gam E-20

Emulsion concentrate containing 20% lindane (1.66 lb. lindane per gal.). Widely used in pest-control work for control of household and industrial pests.

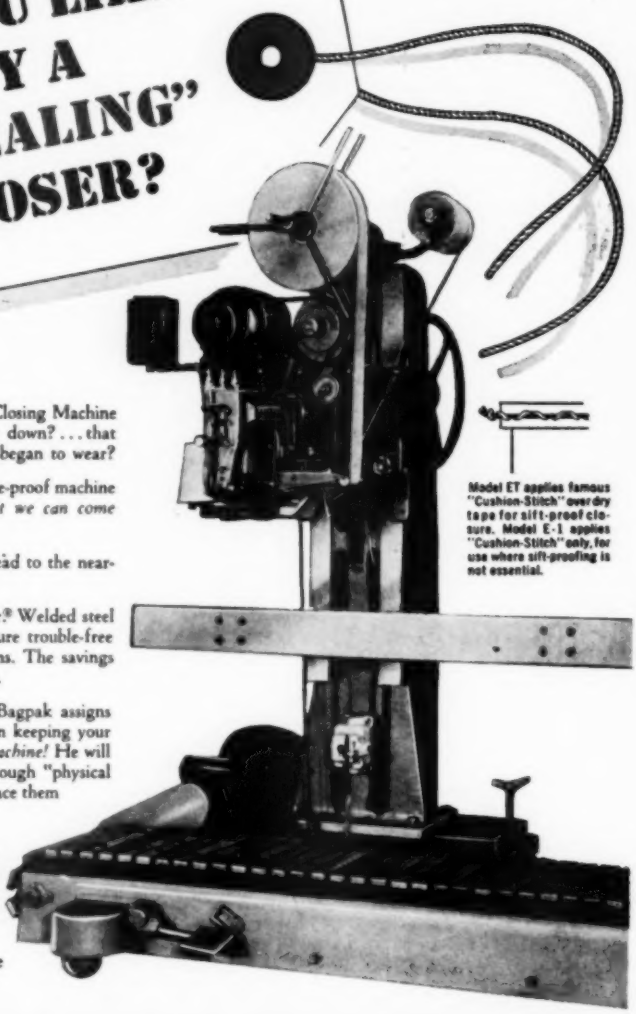
Investigate the benefits possible through use of Pennsalt's lindane products in your finished formulations. Order now to insure an adequate supply. Remember, technical assistance is always available, so write or call: Agricultural Chemicals Department, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa. —Bryan, Texas—Montgomery, Ala.—Portland, Ore. — Tacoma, Wash. — Los Angeles and Berkeley, Calif.

PENN SALT

agricultural chemicals

PROGRESSIVE CHEMISTRY FOR OVER A CENTURY

WOULD YOU LIKE TO BUY A "SELF-HEALING" BAG CLOSER?



Model ET applies famous "Cushion-Stitch" over dry tape for sift-proof closure. Model E-1 applies "Cushion-Stitch" only, for use where sift-proofing is not essential.

Would you like to have a Bag Closing Machine that never got out of order? . . . never broke down? . . . that would automatically "heal itself" if any parts began to wear?

Of course you would. A wear-immune and failure-proof machine is the ideal. We never quite achieve it — *but we can come mighty close!*

Bagpak has taken two important steps which lead to the near-ideal in Bag Closing Machines.

First, extra strength is built into every Bagpaker.® Welded steel construction and heavy-duty working parts assure trouble-free operation — reduce lost time due to breakdowns. The savings on this alone can be tremendous over the years.

Second — and perhaps the most important — Bagpak assigns an experienced Service Engineer to assist you in keeping your Bagpaker in tip-top shape, *for the life of the machine!* He will make regular visits to give the machine a thorough "physical check-up" . . . to look for wearing parts and replace them *before* they can cause a breakdown.

This kind of "preventive service", in addition to the extra serviceability built into every part of every Bagpaker, makes the Bagpak Machine the nearest thing to the ideal Bag Closing Machine you can possibly buy.

For more details about the *better* Bagpaker, write today for booklet 250-D.

International Paper Company

BAGPAK DIVISION

220 East 42nd St., New York 17

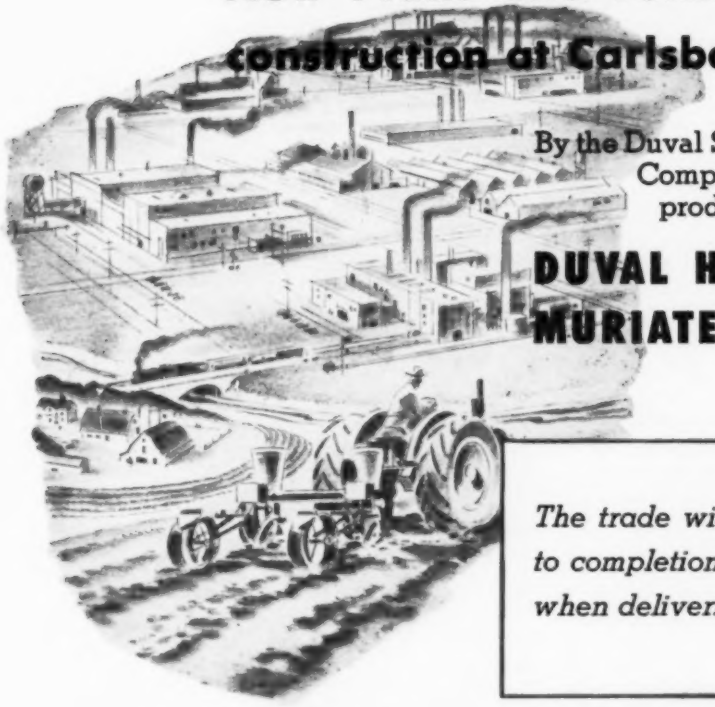
BAG PACKAGING MACHINES

BRANCH OFFICES: Atlanta • Baltimore • Baxter Springs, Kansas • Boston • Chicago • Cleveland • Denver • Los Angeles • New Orleans • Philadelphia • Pittsburgh • St. Louis • San Francisco.
IN CANADA: The Continental Paper Products, Ltd., Montreal, Ottawa.

ANNOUNCING!

A NEW SOURCE OF POTASH

New Plant and refinery under construction at Carlsbad, N. Mex.



By the Duval Sulphur and Potash Company for the production of

DUVAL HIGH GRADE MURIATE OF POTASH

The trade will be informed as to completion of the plant and when deliveries will start.

ASHCRAFT-WILKINSON COMPANY HAVE BEEN APPOINTED AS EXCLUSIVE DISTRIBUTORS FOR DUVAL SULPHUR AND POTASH COMPANY

Address All Communications to

ASHCRAFT-WILKINSON CO.

HOME OFFICE
ATLANTA, GEORGIA
Cable Address ASHCRAFT
NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA. • GREENVILLE, MISS.

DUVAL POTASH FOR BETTER PRODUCTS OF FARM AND FACTORY

OBERDORFER FOUNDRIES, Inc.

OBERDORFER PUMPS
AGRICULTURAL
INDUSTRIAL
FIRE
MARINE

SYRACUSE 1, NEW YORK

The Questionable Future of Agricultural Spraying in 1951

The effective control of insects and weeds by low pressure spraying is attested to by the hundreds of thousands of bronze rotary gear pumps Oberdorfer has placed in the field during the past four years. Our Federal Government, in this emergency, requires substantial crop production increases for the coming season.

From cotton in the Mississippi Delta thru wheat in North Dakota, oats in Oregon and on to tobacco in the Carolinas, the harvest of most every major agricultural crop in this country may be materially increased by following recommended local spraying procedures. This will involve the use of a spray machine equipped with one of the many styles and types of all-bronze, low pressure rotary gear pumps for which this company has been the internationally accepted manufacturing standard for over fifty years.

There is no question but that there will be an acute shortage of such low pressure spraying equipment as a result of the increased acreage to be sprayed plus the recently approved low pressure spraying program about to be placed in operation on a large scale thruout the cotton belt. There will not be enough pumps to go around.

We request that all dealers and distributors of spraying equipment using the Oberdorfer Pump estimate their demand without delay and place their orders with spray equipment manufacturers as soon as possible. Then we both may present to the Director of the Office of Production & Marketing Facilities, U. S. Dept. of Agriculture, in Washington, concrete evidence of our metal requirements so that metal may be allocated by the Federal Government in sufficient time to be of use in the 1951 spraying season.

Agricultural Pump Division
Oberdorfer Foundries, Inc.
Syracuse 1, New York

ESTABLISHED SINCE 1893

it's what's in the

SOIL

that counts

The insecticide, *chlordane,* is capable of controlling a variety of insect pests, such as wireworms, southern corn root worms, seed corn maggots, and white grubs. Among methods developed for the control of these soil borne insects is the combination of *chlordane* and fertilizer. This alleviates an extra step in crop protection.

Inquire today about the new uses for *chlordane;* write to:

VELSICOL CORPORATION

General Offices and Laboratories: 330 EAST [illegible]ND AVENUE • CHICAGO 11, ILLINOIS

EXPORT DIVISION: 100 E. 42nd ST., NEW YORK, N. Y. REPRESENTATIVES IN PRINCIPAL CITIES

WE'VE BEEN SPECIALISTS IN SELECTIVE WEED KILLERS FOR 14 YEARS

STANTOX 2,4-D Weed Killers are available in Stantox containers or under your own private label.

STANTOX "64"
An Alkanolamine salt of 2,4-D acid

STANTOX "P-44"
A propyl ester of 2,4-D acid

STANTOX "T-45"
Contains mixed esters of 2,4,5-T acid

STANTOX "Brush Killer"

SINOX Weed Killers (Nitrated Phenols). The oldest Trade Mark in selective weed killers.

SINOX GENERAL • SINOX REGULAR
SINOX W • SINOX PE

OTHER PRODUCTS

- STANTOX "Aquatic Weed Killer"
- STANTOX "Sodium TCA 90%"
- TOXAPHENE
- PARATHION
- STANICIDE (Aldrin)
- TEPP
- STANAMITE (Miticide)

S
ACI INC.
REG. U.S. PAT. OFF.

STANDARD AGRICULTURAL CHEMICALS, INC.

1301 JEFFERSON STREET, HOBOKEN, NEW JERSEY

THE EDITOR COMMENTS

S. A. Rohwer, who died last month after a long and admirable career in the U. S. Department of Agriculture, was the type of public servant who makes our democratic system possible. Trusted, respected and admired by all who knew him, he had that unique ability to cut through red tape and get things done. It was for this virtue, perhaps more than any other, that he had the complete confidence of American agriculture and the agricultural chemical industry.

Representatives of industry knew that when they went to him with a problem, he was not impressed by bunkum and could see through pretended reasons to uncover self interest; but also that if they were trying to promote some project which he believed to be in the interests of agriculture, or in the broad interests of the country, he would not let red tape block the path of action.

Whenever industry groups gather in the future, they will miss his sage advice and kindly counsel. His talks, usually billed as "remarks by S. A. Rohwer," were always sure to empty the corridors and fill the vacant chairs in the meeting room. He always had something to say, his audience knew, and he wasn't afraid to put it "on the record."

The manner of his passing was typical of the great energy he put into everything he did. Singled out for receipt of the Superior Service Award by the Secretary of Agriculture for the job he did in World War II, he took on the responsibilities of an even more important position in the current rearmament program. He had been serving as special assistant for defense in the Agricultural Research Administration for the past several months. Having assumed these new duties, which involved heavy responsibility, he was working long after hours in the Agriculture Department offices when he collapsed. He died, as he lived, and as his friends know he would have wished it,—in the harness.

SEVERAL recent press releases and pieces of advertising copy dealing with new insecticides have drawn unfavorable comment from government officials. The offending copy in each case describes the new product as being "safer" than other insecticides for which it can be substituted. While admittedly the claim of reduced toxicity hazard has some valid test basis for support, these officials point out that the whole idea of talking "safety" in insecticide advertising is all wrong. Though the product described is measurably "safer", it is still not essentially a really safe material, nor are most insecticides.

It is always dangerous to turn advertising and publicity men loose in any technical field, and particularly so in the insecticide field, where the only sound course is to lean over backwards on any safety claims, following the policy of super caution. Toxicity hazards should be emphasized,—not comparative safety, with any toxic insecticide. Instead of pointing to meaningless toxicity differences, the industry's publicity and advertising should stress the importance of using masks, goggles, respirators, gloves, every precautionary device available, with all even mildly toxic insecticides. Even with non-toxics dusts, the experts point out, there is always the hazard of silicosis.

Particularly this season, with FDA officials and Congressmen running loose on the base paths, and just looking for a few horrible examples to strengthen their case against the industry, we should think that the safe, cautious approach would be indicated more than ever before. A fatality or two with one of these new "safer" insecticides could do the industry a lot of harm, and cost the applicators a great deal in the way of needlessly strict regulations.

An industry entomologist discusses organic, inorganic, and synthetic materials as well as toxicities and mode of action of various

INSEC

ENTOMOLOGISTS have long classified insecticides as stomach or contact insecticides, depending upon the manner in which the toxicants act. Some insects, such as grasshoppers, have mouthparts adapted for biting off and chewing bits of plant tissue. Such pests can be controlled by means of stomach poison chemicals applied to the plants they eat. Other insects, of which the aphid or plant louse are examples, have mouthparts in the form of long sucking beaks that are thrust into plants and used for sucking up sap. Obviously, a stomach insecticide will not be effective against these insects; they must be combatted by contact insecticides, absorbed through the body wall. Fumigants (insecticides applied in gaseous form) can be regarded as special cases of contact insecticides.

Early Control Problems

THE origin of the use of chemical agents to prevent insect attacks, like many of man's modern practices, is lost in the midst of the past. The Roman naturalist, Pliny, reported several materials to be so used and there are even earlier records. However, it was not until about 1870 that the use of insecticides became at all common in America. The depredations of two pests did much to speed the initial interest in chemical control of insects in this country. A beetle originally feeding on certain wild relatives of the potato in the Rocky Mountain area moved into the potato patches of the first settlers in that region and began a rapid and destructive sweep eastward over the newly settled plains to the more extensive potato plantings of the eastern states. This pest was the Colorado potato beetle. At about the same period, the current worm, an invader from Europe, became established on the east coast and moved westward. Control measures were sought for these two pests and it was found that Paris Green (copper acetoarsenite), a material previously used as a pigment, splashed onto potato plants, would protect them from the potato beetle. Paris Green remained for a quarter-century the standard stomach insecticide.

It was long known that mineral oils were toxic to insects. About 1880 the use of kerosene emulsion as an insecticide was started, and until the turn of the century this was the most common contact insecticide. Shortly after 1889, an Australian sheep dip compounded of a mixture of lime and sulfur came into use as a control measure for scale insects on dormant fruit trees. Large quantities of petroleum products and lime-sulfur are still used in the insecticide field. Decoctions of tobacco in which, of course, the alkaloid nicotine was the active ingredient also gained common use about this time.

Early results obtained with these products were somewhat erratic. Kerosene emulsions, lime-sulfur, and nicotine decoctions were made by the grower and varied widely in composition and effectivenes. In response to a definite demand for uniform products, the chemical industry started to make these pest control agents on a large scale under controlled conditions impossible for a grower to duplicate. This was the start of the modern large insecticide industry.

Inorganics First

INSECTICIDES used during the first four decades of this century were dominated by inorganic chemicals or natural products. Paris Green was succeeded by other arsenicals, chiefly lead arsenate, which remained for forty years the standard stomach insecticide. Cryolite (sodium fluoaluminate) and sodium and barium fluosilicates came into the field about 1930. Nicotine, extracted on a large scale from waste tobacco residues, became the most widely used contact insecticide. Two other natural products also came into prominence as contact insecticides. The first of these was pyrethrum, followed by rotenone. Nicotine (as nicotine sulfate), pyrethrum, and rotenone still find extensive application today.

Only a few synthetic chemicals, of which the thiocyanates were most common, were available in 1940 and they enjoyed but a small portion of the insecticide market.

Organic Synthetics Arrive

THE period during and subsequent to World War II has witnessed truly tremendous developments in the insecticide field, and these developments have been almost entirely in the realm of synthetic or-

TICIDES

by
S. S. Sharp
E. I. duPont de Nemours & Co.
Wilmington, Del.

ganic chemistry. The story is now well known how Muller and his coworkers at the Geigy Laboratories in Switzerland found early in this decade, that 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane [DDT], a chemical known since 1879, had extremely effective insecticidal action. There was a serious need at this time for an effective insecticide for military use as a control agent for the lice, fleas, and other pests so important in spreading disease under the disrupted conditions associated with military operations. DDT offered the answer; it was first produced in this country in 1943 and in two years the annual production had risen to over 30 million pounds. Its remarkably rapid adoption was due to the waiting market for a product of unusually high efficiency against many insects. DDT is easily manufactured by the reaction of chloral and chlorobenzene.

Excellent though it is, and although it enjoys first rank in the field of insecticides, DDT is not necessarily the ideal insecticide. There are pests against which it is ineffective and other pests which are controlled better by other materials. Several other new insecticides have achieved substantial markets in spite of the competition of DDT simply because they are better products for certain purposes. Even before DDT became known in this country, 2,2-bis(p-methoxyphenyl)-1,1,1-trichloroethane had been synthesized successfully. This compound, called methoxychlor, is effective against certain pests not controlled by DDT, and its lower mammalian toxicity permits application on dairy cattle, on vegetables and fruits close to harvest time and for other uses where DDT residue would be undesirable. Of the many other analogues of DDT that have been synthesized, only one, 2,2-bis (p-chlorophenyl) - 1, 1 - dichloroethane DDD) has been effective enough to attain commercial status.

BHC Makes History

THE chemical 1,2,3,4,5,6-hexachlorocyclohexane, commonly called benzene hexachloride or BHC, has been known even longer than DDT, being synthesized first by Faraday in 1825. It remained a gem unmined, however, until its insecticidal effectiveness was discovered by workers at the British firm of Imperial Chemical Industries in 1942. At first the British experienced considerable variation in the effectivenes of different samples of BHC, a difficulty that was resolved when it was learned that at least five different stereo-isomers of BHC exist, of which only one, the gamma isomer, has any significant degree of insecticidal activity. The gamma isomer occurs to the extent of 10-20 percent in the technical product which is readily prepared by the photochemical chlorination of benzene. It can be separated by various techniques from the inactive isomers. The name lindane has been given to the substantially pure gamma isomer of BHC. BHC is effective against a wide range of insects, having found large scale usage on grasshoppers, aphids, livestock pests, and especially cotton insects. BHC is more volatile than DDT and shows definite fumigant action. Technical BHC has a pronounced characteristic odor, often described as "musty". When used as a soil insecticide the toxicant may cause off-flavor or tainting in root crops such as potatoes, and when applied as a spray may affect adversely the flavor of fruits, especially if used near harvest. Lindane is much less offensive in this respect than technical BHC.

Other Synthetics

THE chemical 1,2,3,4,5,6,7,8. 8-Octachloro-4,7-methano-3a,4,7,7a-tetrahydroindane, which the Federal Interdepartmental Committee on Pest Control has named chlordane, is an American contribution to the insecticide field. It is made from cylopentadiene and chlorine. Chlordane has found its largest use in grasshopper control, but is also effective against cockroaches, ants, fruit insects, etc. Aldrin and dieldrin are two other Diels-Alder condensation products that are becoming established in general insecticide usage. They seem especially successful on cotton.

Toxaphene differs from the insecticides previously mentioned in being produced from a natural product: camphene, obtained from pine oil, is chlorinated to a chlorine content of 68 to 70 percent. Technical toxaphene is a waxy, low-melting solid which has found major uses in cotton insect and grasshopper control,

* Presented at Pesticide Symposium, Chemical Engineers Club, Washington, D. C. Nov. 13, 1950.

but is useful against many other pests as well.

The compounds just discussed are broadly classified as the chlorinated hydrocarbons. They are all water-insoluble but can be dissolved in the ordinary organic solvents or even in kerosene in some cases. To a greater or lesser degree they are susceptible to alkalin decomposition, undergoing dehydrohalogenation in the presence of lime, ammonia, and other alkaline agents with resultant loss of insecticidal effectiveness.

The other large group of postwar insecticides is represented by the organic phosphorus compounds. During, or immediately preceding World War II, the German chemist Schrader, apparently as a part of the German chemical warfare research, found that cetain compounds of this type had high insecticidal activity. Tetraethyl pyrophosphate is another example of a chemical known for many years (since 1854), but which was not discovered insecticidally until Schrader's studies. Pure TEPP is a colorless liquid, miscible in all proportions with water. It hydrolyzes rapidly in the presence of moisture to form insecticidally inactive decomposition products. The high rate of hydrolysis limits the effectiveness of TEPP, but is also a boon since the rapid decomposition permits its use on food plants even within a day of harvest without any risk of residue hazard. TEPP can be produced commercially from triethyl ortho-phosphate and phosphorus oxychloride. The reaction results in a mixture of phosphates from which the TEPP can be isolated. TEPP, like other organic phosphorus insecticides, shows a high degree of activity against many insects, but it is finding its largest outlet in aphid and mite control.

Parathion is the common name given to 0,0-diethyl-0-p-nitrophenyl thiophosphate. The insecticidal value of this material is another of Schrader's discoveries, although the compound was patented years before for other purposes. Technical parathion is a dark brown liquid, immiscible with water. It can be synthesized from sodium ethoxide, $PSCl_3$, and sodium p-nitrophenate. Parathion is a contact insecticide and its effectiveness against a wide range of insects has gained for it extensive agricultural use. Its residual action is limited by a definite volatility. The compound is very toxic to warm-blooded animals.

Ethyl p-nitrophenyl thionobenzenephosphonate (EPN) is an organic phosphorus insecticide which has appeared on the market during the past year. It has achieved wide use as a miticide and shows much promise as a general insecticide as well. EPN is characterized by a lower volatility and lower mammalian toxicity than parathion.

The last phosphorous compound to be mentioned has not yet attained any appreciable commercial status in this country, but is interesting because of its novel method of action. This compound, octamethylpyrophosphoramide, is characterized by its systemic action, i.e., the compound is absorbed into the plant either through the roots or through the foliage and is translocated within the plant, rendering the plant toxic to aphids and some other sucking pests that subsequently feed on it. Because thorough coverage is not essential with a systemic insecticide and because a material within the plant is immune to weathering, the systemic insecticides offer fascinating new control possibilities to the entmologist.

Pyrethrum, mentioned previously, is unique in having a very rapid paralytic action on insects, and is probably the safest of any known insecticide to warm-blooded animals. The insecticidally active ingredients of pyrethrum are four closely related compounds of such complexity that little hope was held for their practical synthesis. However, after years of study on the chemistry of pyrethrum, Dr. B. F. La Forge and his associates in the U.S.D.A. succeeded in synthesizing the allyl homolog of cinerin I, one of the components of pyrethrum. This compound has much of the activity of natural pyrethrum and is now being produced commercially.

Formulations Important

AN extensive resumé of all the many new insecticides being tried or used on a limited scale today can hardly be included here, but an attempt is made to cover some of the more significant developments in the field.

Chemicals are of value for the control of insects only as suitable formulations and equipment are available to bring them into contact with the insects concerned. The importance of formulations is not generally appreciated. None of the chlorinated hydrocarbons or organic phosphorus insecticides, with the possible exception of TEPP, are suitable for insecticidal use as manufactured. They must be compounded with satisfactory diluents, carriers, or inert materials before they can be mixed with water for use in sprays or applied as dusts. The chief formulations in which insecticides are used, are wettable powders, emulsifiable compositions, solutions in oil or other solvents, and dusts.

Some insecticides are relatively harmless to man and domestic animals while others are highly toxic. Their use involves hazard, not only to the grower but to the consumer of food products treated with them. There is a growing awareness of the importance of using pesticides safely. It is essential that these valuable aids in the production of food be used in a manner that will not endanger the public health. Residues of toxic materials on treated crops are especially objectionable. The Food & Drug Administration charged with the responsibility of keeping deleterious chemicals from the nation's food have taken recognition of this fact; tolerances prescribing safe limits of insecticides on fresh produce have been promulgated in the past for some of the older insecticides such as lead arsenate. The tolerance hearings conducted during the past year also have the purpose of determining safe and reasonable quantities of insecticides permissible in foods. While the government thus protects the consumer to some extent, it is also the responsibility of the manufacturers of insecticides and of state and federal entomologists to see that the users of such products

(*Turn to Page* 111)

Chemicals . . .

For Control of Fruit Diseases

CHEMICALS are used extensively by the fruit industry to destroy the various fungi and bacteria attacking the twigs, leaves, and fruit. The production of disease resistant varieties by breeding, so fertile a field for workers with grain and vegetable crops, is a slow and tedious process with most fruit crops and for many years to come commercial fruit production will depend upon the use of chemical compounds to control fungus and bacterial diseases.

To be satisfactory, a chemical used for disease control must be toxic to the parasite but should be noninjurious to the host plant. Its effectiveness should continue for a reasonable period (at least 10 days) and it must not leave a residue that is toxic to animals or man. It should be compatible with insecticides, and last but not least, it must be inexpensive. Inorganic compounds containing copper, sulfur, zinc, and boron and organic compounds such as the dithiocarbamates, phenyl mercury derivatives, chlorinated naphthoquinone, quaternary compounds, metallic quinolinolates, glyoxalidine derivatives, phthalimide derivatives, nitrated cresols, and chlorinated phenols are all in use at the present time. No single material now available possesses all the attributes enumerated above and the search for the ideal fungicide continues.

Inorganic Fungicides

Copper Compounds. Copper sulfate was used as early as 1807 for the treatment of grain smut. In 1882, Millardet discovered that a mixture of copper sulfate and lime, subsequently called bordeaux mixture, destroyed the grape mildew fungus. We can only hope, since it does not seem to be recorded in the annals of science, that this mixture was as effective in controlling the pilfering of grapes in France, its original purpose, as it has been in killing fungi.

Bordeaux mixture has been tried as a control for almost all types of diseases on a vast array of host plants. It is still one of the most effective fungicides available but in the deciduous fruit industry it has fallen into disfavor since it is likely to produce serious injury on the fruit and leaves.

In an effort to reduce this injury but retain the effectiveness of the copper ion against fungi producing such diseases as apple blotch, apple bitter rot, pear scab, grape black rot and cherry leaf spot, compounds of the so-called "insoluble" group, such as cuprous oxides, basic sulfates, silicates, and oxychlorides, have been prepared. None of these substitutes has been a complete solution to the problem of copper injury to fruit trees in the United States.

European pathologists visiting U. S. Department of Agriculture laboratories say that the "insoluble" coppers are used extensively in Europe but that European consumers are not so critical as are Americans regarding the finish of the fruit.

By

John C. Dunegan

Senior pathologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Maryland

Copper compounds still find extensive use on semitropical and tropical fruits such as orange, grapefruit, avocado, mango, lime, and banana.

Sulfur. Because of the extreme sensitivity of certain members of the genus *Prunus*—particularly the peach—to copper injury, the fungicidal properties of the element sulfur must be relied upon to control such common diseases as peach brown rot and peach scab. Simple mechanical mixtures of sulfur and lime have been used succesfully for many years for this purpose without injury to peach. Apricot, on the other hand, although it is a close relative of peach is severely injured by sulfur; this difference is one example of the many complex problems facing fruit pathologists.

A mixture called lime-sulfur, produced by boiling sulfur and lime together, has long been used as a dormant spray to control peach leaf curl and in the early part of the growing season to control pear scab, apple scab, and apple mildew. Calcium polysulfides, the principal active constituents of lime-sulfur, are very effective fungicides but they produce a definite sulfur shock type of injury when used on apples and in many seasons cause russet on apple and pear fruits. An effort is being made to replace sulfur as well as copper with less harmful materials.

Zinc Compounds. Inorganic zinc compounds have been used in fruit disease control for very specific purposes. A preparation known as zinc-lime which is merely a bordeaux mixture with zinc sulfate substituted for copper sulfate, was devised for

the control of a serious bacterial disease of peach known as bacterial spot. The discovery of this compound has a curious history. J. W. Roberts, of the U.S. Department of Agriculture, in 1921 noted reports from France that a mixture of ultramarine blue, zinc sulfate, lime, and aluminum ammonium sulfate was supposed to be extremely efficient against fungi on leaves. The virtue of this preparation, it was claimed, depended upon a combination of the antisptic action of zinc plus the toxic effect of the blue, violet, and ultraviolet rays concentrated by the thin layer of blue dye deposited by the spray on the leaves. Simple experiments in the United States demonstrated that the mixture was just as effective without the ultramarine blue and the alum and thus the zinc-lime spray was originated.

It was found subsequently that the zinc-lime spray also retarded the development of arsenical injury on peaches but the main function of zinc-lime as a fruit spray is still the control of bacterial spot. In some sections it gives very satisfactory results but in general it is only a palliative measure.

Zinc sulfate is also used as a dormant spray to correct zinc deficiency symptoms in areas where the soil is deficient in this element and has given favorable results.

Boron. For many years apple growers in a number of producing areas were troubled by a serious internal breakdown of fruit tissue. It was found that the symptoms developed when the trees were growing in soils deficient in boron, and application of boric acid or borax to the soil around the trees completely corrected the condition.

An obscure type of bark necrosis of apple trees has also been reported to be prevented by applications of boron while citrus growers have found that dipping fruit in a 5- to 10-percent aqueous solution of Borax gives partial control of stem-end rot and green mold.

Organic Fungicides

THIS discussion now moves to the organic materials around which much of the experimental work of recent years has revolved in an effort to eliminate the spray injury problem.

Dithiocarbamates. Probably the most widely used of the organic materials are the various metallic methyl and ethylene derivatives of carbamic acid.

Ferric dimethyldithiocarbamate, or ferbam, has been found to be effective in fruit sections east of the Rocky Mountains for the control of the cedar rust diseases of apple. The action of ferbam against the fungi causing these rusts is unique and the material may be considered a specific, in the strict medical sense. This specificity gives plant pathologists and fruit growers a new tool and spraying for cedar rust control has become a feasible procedure.

Ferbam is used also to control apple scab, blotch, and bitter rot. The fungi causing these diseases are prevalent in the humid sections east of the Great Plains and are capable of destroying the entire fruit crop. Ferbam is not quite equal to lime-sulfur in its effect upon the apple scab fungus but is just as effective as bordeaux mixture against the apple blotch and bitter rot fungi. These fungi are inactivated by ferbam without the risk of spray injury.

The substitution of ferbam for sulfur has been accompanied by an increase of as much as 300,000 boxes of Anjou pears per season in Oregon. This increase is due largely to the improvement in set of the fruit on the individual trees and in the production of russet-free fruit. Sulfur and ferbam are equally effective in controlling the pear scab fungus but ferbam does not produce the phytotoxic effects that sulfur does.

In the east, ferbam has been of exceptional value in controlling the pear leaf blight fungus. Here again, its use avoids the injury so commonly accompanying the use of bordeaux mixture or lime-sulfur.

On cherries and grapes, ferbam is being used instead of bordeaux mixture to avoid copper injury, while on cranberries, ferbam has given generally good control of fruit rots.

Ferbam has been used on peaches for the control of brown rot and scab but on this fruit this material leaves an objectionable stain, and the colorless zinc salt, ziram (zinc dimethyldithiocarbamate), is the preferred material. It was hoped at first that ziram would also control bacterial spot but this has not been the case.

Metallic ethylene dithiocarbamates, nabam (disodium ethylene bisdithiocarbamate) and zineb (zinc ethylene bisdithiocarbamate), have been used on cherries, apples, and grapes to control specific fungus diseases and eliminate at the same time the risk of copper injury. It is reported that zineb has proved of value in the control of pear blight in Colorado; if this finding is confirmed in other sections, a new phase will be introduced in the use of organic chemicals in fruit pathology.

Quaternary Compounds. A number of quaternary compounds, a group that has considerable industrial use as surface-active disinfectants, have been tested for the control of fruit diseases. Most of them have been found ineffective. During the past few years, however, dimethyl dialkyl ammonium bromide has given encouraging results and further experiments will be carried on in 1951 with this quaternary compound.

Phenyl Mercury Derivatives. Since ferbam has not proved to be the equal of lime-sulfur for the control of the apple scab fungus, fruit pathologists have continued their search for an effective substitute. Phenyl mercury derivatives, particularly phenyl mercury triethanol ammonium lactate, give promise of being the solution to the problem. This compound used at a dilution of 1 to 16,000 has excellent eradicative properties and does not cause injury to either fruit or leaves. Other derivatives such as phenyl mercury monoethanol acetate, phenyl mercury formamide, and phenyl mercury acetate have not been tested quite so extensively but they have a tendency to produce foliage injury under some conditions.

These mercury compounds are not protective sprays and do not have a lasting effect in the orchard. During the past season, experiments were carried on with mixtures of organic

Both organic and inorganic compounds used by fruit industry to combat fungi and bacteria attacking twigs, leaves and fruit. Disease control chemical must be toxic to parasite, yet non-injurious to valuable host plant

mercury and ferbam in an effort to correct this defect and the combination gave promising results. If a combination eradicative and protective spray can be developed, scab and cedar rust can be controlled with the same treatment.

Since mercury is a poison, some concern has been felt lest the indiscriminate use of these compounds lead to the accumulation of appreciable quantities of objectionable residue on the fruit. At the present time the mercury sprays are recommended for use only during the blossoming period to ensure the minimum quantity of mercury being present on the fruit several months later when it is harvested.

Chlorinated Naphthoquinones. Only one compound in the chlorinated naphthoquinone group, 2,3 dichloro 1,4 naphthoquinone, has been used extensively in fruit disease control. In 1944 we had the privilege of giving this material one of its first extensive tests as a substitute for bordeaux mixture in the control of the apple bitter rot fungus. The degree of control obtained was extremely satisfactory, but unfortunately it produced a spotting of the apple skin. The experiment, however, demonstrated that bordeaux mixture was not the only material that could be used for the control of the bitter rot fungus. Subsequent experiments with this and other materials have demonstrated that the risk of severe copper injury —a risk which always accompanied the use of bordeaux mixture for bitter rot control—can be eliminated.

2,3 dichloro 1,4 napthoquinone has been found to be very effective for the control of blossom blight of peach due to the brown rot fungus and in some sections it has given excellent control of the apple scab and cherry leaf spot fungi.

This material is a very powerful fungicide but unfortunately it has certain defects. Its effect on apples has been mentioned. On peach fruits it has at times produced an objectionable brown stain and it may delay ripening. It also causes an irritation of the skin of certain individuals.

Metallic Quinolinolates. A number of metallic quinolinolate salts have been suggested as possible fungicides. Copper 8-quinolinolate in particular has been tested for use on peaches and is one of the few copper-containing compounds that can be used on this host without producing serious foliage injury. Unfortunately, this material proved to be ineffective for the control of peach bacterial spot. The analogous zinc salt has likewise not been promising.

Glyoxalidine Derivatives. During the past five years various investigators have reported upon the effectiveness of glyoxalidine derivatives for the control of a number of plant diseases.

One of these derivatives, 2-heptadecyl glyoxalidine, has been found to be especially effective for the control of the cherry leaf spot fungus. The material has also been tested for the control of the apple scab fungus and recently a purified form of the commercial product has given promising results for the control of peach brown rot and scab, as well as of anthracnose of brambles.

Glyoxalidine derivatives are supplied as solutions of glyoxalidine acetate in isopropanol. Experimentation has shown that some lots of the material have had some injurious effects upon certain host plants. This phytotoxicity is believed to be due to the presence of unsaturated compound, 2-heptadecenyl glyoxalidine.

Phthalimide Derivatives. Recently a complex chemical, N-trichloromethylthic tetrahydrophtha-limide, has been released by a large industrial organization for field testing. This material has been used against a variety of fruit diseases and is reported to be effective against apple scab, peach scab, brown rot of cherries, and bacterial spot of the peach.

Nitrated Cresols. Various dinitro cresols are widely used as insecticides during the dormant season, and plant pathologists have found that sodium dinitro ortho cresolate is especially useful as a ground spray to kill the ascospores of the apple scab fungus on fallen apple leaves. Properly applied, this material has killed up to 98 percent of the ascospores.

Ground sprays of this material followed by applications of phenyl mercury derivatives give promise of reducing to a minimum the primary infections on the apple leaves and fruit.

Chlorinated Phenols. Sodium pentachlorophenate has been used in California to kill the brown rot fungus overwintering on apricot twigs. This compound, while effective in killing the fungus, has caused some injury to the twigs and its use is still in the experimental stage.

Recent Experimental Work

IN this discussion of chemicals used for fruit disease control other compounds should be mentioned, such as sodium hypochlorite, copper zinc chromates, bis (2 hydroxy-5 chlorophenyl) sulfide, dihydroxy dichloro diphenyl methane, diphenyl carbonate, manganese ethylene bis dithiocarbamate, and dinitro capryl phenyl crotonate. These compounds are being used experimentally but their ul-

(*Turn to Page* 118)

Agricultural productivity in Israel greatly increased by expanded use of

Pesticides and Fertilizers

"THE colonization of the wasted land of Palestine by Jewish pioneers is one of the most significant phenomena of our day in the relation of a human population to its land." The quotation is from an address made by Dr. Walter Clay Lowdermilk, Assistant Chief of the U. S. Soil Conservation Service, before a Washington audience after he had returned from a three month's survey of Palestine in 1940. At that time Dr. Lowdermilk also said, however, that the 250 agricultural colonies covering five per cent of Palestine's area, though "demonstrating that land has other values than its commercial products," did not pay for themselves, commercially speaking.

That was 10 years ago. Palestine then had a Jewish population of about 600,000. Today the country that is now Israel is faced with the two-fold problem of absorbing almost 400,000 new immigrants who arrived since the state was established in May 1948, and with achieving the highest possible degree of agricultural self-sufficiency. Its settlements no longer are mere idealistic ventures—most of them are now on a solid business basis, and the rest are being made to pay for themselves as rapidly as possible. Because of Israel's adverse balance of trade—almost eight to one in her disfavor—she is forced to attempt to produce almsot all of her food herself and to save her hard currency for imports of machinery.

To achieve these two aims, the Government, though its Ministry of Agriculture, has worked out an ambitious four-year-plan under which the country's total cultivated area is to be doubled. The agricultural settlements—now over 400 of them—will be the country's economic backbone.

Fertilizers Emphasized

IN bringing this about, chemical fertilizers, for the first time in the history of Middle East agriculture, are playing an outstanding role. Their widespread use in the territory thus far cultivated has already made the new country the most progressive agricultural area in the Middle East. Israel farmers are getting an average yield of 300 lbs. of wheat per dunam

Below: Agricultural settlement of Kiryat Anavim in 1928, shortly after it was founded. (Location is in Judean hills, 10 miles northwest of Jerusalem). Note remnants of ancient terracing on eroded hillside (center and top) and new terraces at left, bottom.

by

Ernest Stock

(¼ acre), while the Arab farmer, using the old methods, has been getting only 130 lbs. A yield of 650 lbs. is the aim.

The trend of 1,500 years during which the soil of the Holy Land was allowed to deteriorate by erosion and primitive methods of agriculture has been reversed. While during biblical times and for several centuries A.D., the agricultural possibilities of the Holy Land were developed on a sound basis for the conservation of soil and water—mainly through rock wall terraces progressively built to hold back the soil during the rainy season—these methods of conservation were destroyed when the country was overrun by the Mussulmans from Arabia in the 7th century.

Since then, erosion has taken its toll with each heavy rainstorm, and fully one-half of the country is eroded of all its soil. Government figures show that the run-off of storm water during an average year is from 500 to 600 million cubic meters, with a mean silt content of 1.4 per cent. The quantity of silt thus carried away is from 11-14 million tons every year.

As the soils were sent from the mountain slopes into the narrow valleys, they were sorted by the storm waters; the finer particles were carried out to sea, the heavier ones were spread out on the old alluvium of the valley floors. These soils, however, are capable of agricultural production when properly managed.

Other once fertile tracts had, through centuries of neglect, become swamps. The greatest part of the country turned into a desert after the break-down of the irrigation system. This process was further accelerated through the indiscriminate grazing of

Partial view of same section seen on opposite page. 21 years later. Reforestation, irrigation and use of fertilizer materials account for difference. This hill, known for its vines in biblical times, now supplies grapes to the nearby city.

herds of goats and sheep who nibbled away the plants holding the soil together.

During the past fifty years of Jewish colonization in Palestine, the foremost method of land reclamation was swamp drainage. Many of the colonies which Dr. Lowdermilk admired had been marshy, pest-ridden areas a few years before. The entire Plain of Esdraelon, stretching from the Mediterranean near Haifa almost to the Jordan Valley and now the site of dozens of flourishing settlements, was one vast malaria-infested swamp. Altogether, more than 125,000 acres of swampland have been freed from malaria and made habitable.

Reforestation has also proceeded on a large scale. In the hill country of Judea and of Galilee, immigrants are laboriously reshaping the crumbled terraces to prevent the soil from being washed away. But in the future, the major battles in reclaiming the land will be fought by irrigation and by chemical fertilizers.

On the irrigation side, the main project ready for execution is a pipeline to pump water from the Yarkon River, which empties into the Mediterranean near Tel Aviv, down to the Negev, the semi-desert to the south. Plans for this work are now in their final stage and the actual work will begin this summer. The scheme is part of the irrigation plan worked out for the country by Dr. Lowdermilk: it is virtually the only part which can be put into execution without the cooperation of the neighboring Arab state of Jordan, which now occupies the Arab areas of what was the British Mandate of Palestine.

Much Fertilizer Needed

IN the Negev alone, vast quantities of nitrogeneous, phosphatic, potassic and compound fertilizers are needed. Fertilizer requirements for 1950 were considerably higher than the already substantial 1949 consumption, because of the needs in the Negev and in the expansion of the cultivatable area of other parts of the country.

The import of the required quantities would in the long run be an unbearable strain on Israel's hard currency resources, and great efforts are being made to render the country self-sufficient in fertilizers.

A chemical fertilizer plant, Fertilizers and Chemicals Ltd., began operations in the industrial Haifa Bay area in 1949 and will eventually supply all of Israel's needs. The plant now produces sulphuric acid and single superphosphate, but it is also equipped to make potassium sulphate and will begin in this field of production as soon as the potash of the works of the Palestine Potash Company at the Dead Sea becomes available once more. There are still some stocks of potash left at the company's plant at the South end of the Dead Sea, but their transport northwards awaits the completion of a road to Beersheba. The potash was formerly barged to the Northern plant—destroyed by the Trans-Jordan Arab Legion during the war—and then transported to the Jerusalem railhead through what is now Jordan territory. Fertilizers and Chemicals gets its rock phosphate from North Africa and Florida. When peace with Jordan is signed, the plant will be able to draw on the raw material available in large quantities north of Amman. A sorely-needed by-product will be hydrochloric acid, which is now being artifically produced from table salt and marketed at an inflated price.

The plant eventually intends to take up the production of nitrogeneous fertilizer. Production is ex-

Partial view of new plant of Fertilizers and Chemicals, Ltd., in Haifa Bay. The output of such modern factories is making history in the agricultural revolution in Israel.

pected to get underway in 1951, and by that time, it is hoped, the country will be self-sufficient in all types of fertilizers. Equipment for the new branch of the plant has already been purchased in the U. S.

A part of F. & C. is owned by American capital, through the Palestine Economic Corporation. Another part is owned by the inland marketing organization of the General Federation of Labor, Hamashbir Hamerkazi. The latter organization is also the plant's best customer, since 70 per cent of all fertilizer is used by the cooperative and communal settlements, most of whom are affiliated with the trade union.

All the cooperative and communal settlements use modern methods of farming. They delegate their members to courses in the correct use of fertilizers and of plant and animal protection chemicals. Arab farmers, who cultivate 75,000 hectares of Israel's land, are also being introduced to fertilizers. The Agricultural Research Station at Rehovot, which was founded in 1909, constantly tries to evolve better ways of farming on the country's soil.

The giant strides taken by Israel agriculture within the space of a single year are illustrated by the rise in the requirements of nitrogeneous and compound fertilizers. In 1949, 8,000 tons of sulphate of ammonia were imported for use as straight nitrogeneous fertilizer and 4,000 additional tons for use as compound, combined with 12,000 tons of locally produced single superphosphate.

(Most of the sulphate came from Britain, the balance from the Benelux countries. Britain monopolized the supply of fertilizers under the mandate for 30 years. Now Israel imports plant protective chemicals, especially weed killers, from the U.S.)

The 1950 requirements totaled approximately 25,000 tons of sulfate of ammonia and 50,000 tons of single superphosphate. C & F's present capacity for the latter is only 20,000 tons yearly, but its facilities are being expanded to cope with current demand.

The main areas of cultivation, as of the beginning of 1950 were 150,000 hectares of cereals (to be increased to about 270,000 hectares by the end of 1951), 12,500 hectares of citrus fruit, 5,000 hectares of vegetables and potatoes (this rose from 1,700 in 1948), 12,000 hectares of fodder, 10,000 of olive trees, 4,000 of fruit trees, 300 of bananas and 800 of vine.

To provide the needed manpower, the Government settled some 17,000 new immigrant families on the land in 1950 alone. 3,000 of them were expected to be absorbed into existing settlements, the rest founding new farms and villages. The use of plant protection products has grown in proportion with the cultivated area, from about 150,000 pounds in 1949 to an estimated 400,000 pounds in 1950.

In this respect Israel is now the most progressive country in Asia — even absolute figures here are much higher than elsewhere; relative figures are among the highest in the world.

Pest control by dusting and spraying from airplanes has also recently been introduced. A commercial company employing two ex-U. S. Army Air Force fliers, uses two piper cubs.

Another problem that is being tackled by chemicals is the fight against field mice. The rodents last year overran an estimated 30,000 hectares, and the government spent large sums of wheat poisoned with thallium sulphate to control them. Animal protection, such as dipping cattle against ticks, has also been introduced generally.

Another view of same plant of Fertilizers and Chemicals, Ltd., Haifa Bay. Striking contrast of old and new noted upon observing the ancient hills in background.

How to diagnose and to avoid....

2,4-D Tree Injury

AFTER several years of experience with the selective herbicide, 2,4-D, its relative merits and shortcomings can be appraised more accurately. Technical advisors in the horticultural field, men who work with herbicides day after day, have been able to evaluate 2,4-D and its use and abuse in practical applications during the past five years. Through direct experimental work, especially in brush control, symptoms of 2,4-D injury have become more familiar on a wide range of species of woody plants. Information in this article is in effect, a summary of technical and semi-technical writings of qualified observers in the field who have reported on the problem.

As time passes, it becomes more and more evident that 2,4-D as a weed eradicator, is not an unmixed blessing. It becomes a double-edged tool with which, in attempting to

PHOTOS. THIS PAGE:

Above: American elm tree badly injured from having absorbed 2,4-D through its roots. The lawn had been sprayed with solution of amine salt. This photo taken a year later.

Below (A) Distortion of largetooth aspen: (B) willow distorted by herbicide application.

The information presented here is designed mainly as a warning which may be passed along by the supply house to the unknowing or careless operator. It should be emphasized, however, that 2,4-D, when used according to formulators' directions, is one of the safest and most valuable chemical tools of the horticulturist.—The editor.

beautify lawns, great harm can be done to trees which are perhaps the most important, most expensive, and most nearly irreplaceable pieces of greenery about a home. During last year, in specimens from the field and in direct examinations on field trips, symptoms and case histories so frefuently could lead only to diagnosis of 2,4-D injury, that one is forced reluctantly to conclude that the shade trees on lawns are now confronted with a "new disease".

Before finding a way to correct such damage on trees, it is necessary first to recognize 2,4-D injury. Actually, such injury is sometimes difficult to diagnose, particularly when home owners are inclined to place the blame for ailing trees on tree workers who have perhaps sprayed or fed a tree sometime previously. But when one realizes that millions of pounds of 2,4-D are used annually to control weeds in fields, orchards, lawns, gardens and pastures, it is not hard to understand how trees might be damaged. It is applied to kill or control brush along railroads and beneath telephone and power lines. In concentrated form, it is applied by airplane, helicopter and by mistblower. In more dilute solutions it is used in farm spray rigs or by high pressure shade-tree type sprayers pouring out many gallons per minute. Hardly a lawn is so modest that it has not been doused to some degree, as knapsack sprayers, sprinkling cans and hand dusters contribute to the 2,4-D pollution of the soil and air around shrubbery, shade trees and flower beds.

Volatility a Factor

THOSE familiar with 2,4-D are acquainted with the volatile and non-volatile forms of the herbicide, and are aware that the former types are subject to drift in air currents. Thus, the ester type, may cause damage to sensitive and valuable crops or ornamentals near the lawn or even some distance away from the place where the herbicide was applied.

However, there are means of preventing injury from careless application. Three faults are usually responsible for injury to plants other than the ones being treated. These include the direct "splash" or droplet drift from careless application or from spraying too close to shrubbery or low growing trees when a strong wind is blowing. Naturally, this type of injury is not found any great distance from the point where the spray was applied. Actual mist or droplet drift can usually be seen and its danger recognized and guarded against by the careful operator. This type of injury is most likely to occur by use of hand sprayer near shrubbery or low border plantings and can result from use of either volatile or non-volatile forms of chemical. It is of course not liable to happen to tall trees from non-volatile materials unless such materials are used in a large pressure sprayer. This direct drift, therefore, is perhaps the least dangerous to large shade trees.

But the second factor in tree injury, vapor drift, is so dangerous, so common and at times so difficult to believe, that it must be discussed more fully. It should be remembered that few valuable plants are immune to the effects of 2,4-D. This applies even to lawn grasses which can be injured by strong solutions or excessive applications of 2,4-D but which are ordinarily affected but little by the concentrations commonly applied to lawns. Broad-leaved plants generally, are more susceptible than the grasses, which means that many trees, shrubs, flowers and garden crops may be harmed or even killed by dosages proved to be completely safe to use on grasses. Broad-leaved plants are likewise susceptible to injury from vapor drift.

(*Turn to Page* 122)

PHOTOS BELOW:

(C) Distortion of tupelo foliage caused by nearby spraying with isopropyl ester of 2,4-D after growth had begun.

(D) Sassafras foliage twisted and distorted by the application of isopropyl ester of 2,4-D. Such distortion is caused generally by uneven growth of cells following exposure to hormone chemicals.

World Consumption of

Pesticide Materials

Editor's note: Part I of this issue, carried tables of figures on world pesticide consumption referred to in this, the concluding part of the compilation.

Chile

IN recent years, production of organic pest control products has been inaugurated in Chile but output is not large. Sheep and cattle dips are consumed in large quantities with the U.K. and Argentina as the principal suppliers. However, according to Chilean import data, the U.S. is the source for about half of imports. According to U.S. export statistics, the trend is toward organics. Exports of inorganic materials to Chile dropped from $23,000 in 1939 to $2,500 in 1949, while organic commodities increased from $21,000 to $61,000.

Colombia—Colombia seems to be the one exception in South America where use of organics has not increased percentagewise compared with that of inorganic pest control chemicals. According to Colombian statistics, the U.S. supplies about 70 percent of imports. In 1939, U.S. exports to that country consisted of $27,000 worth of inorganic materials and $105,000 in organic commodities, while in 1949, shipments of inorganics had risen to around $480,000 and organics to $750,000.

Ecuador—The Direccion General de Sanidad (a government organization) accounts for 60 percent of consumption of pesticides in Ecuador, use of DDT by this organization almost doubled between 1948 and 1949. The U.S. is the principal supplier of all types of pest control chemicals. Such exports of inorganic materials to Ecuador showed little difference between 1939 and 1949, and the dollar value involved in both years was small, while exports of the organic classifications increased about eight times in the same period—from $13,000 to $101,000.

Paraguay—Pesticides are not produced in Paraguay, and the U.S. practically monopolizes the market, which would be larger if dollars were available. United States exports of inorganic pesticides to this country were nil in 1939 and only negligible in 1949, but shipments of organic commodities rose from $6,134 to $86,770.

Peru—At present about 25 percent of Peru's consumption of pesticides consists of calcium arsenate (domestically produced) and 10 percent of sulfur, with the remaining 65 percent constituting organic materials. However, Peruvian sources anticipate that use of calcium arsenate (principally on cotton) will decrease to about 10 percent of the total, with a corresponding rise in consumption of organics. The United States is the source for over 90 percent of imports; in 1939, 80 percent of United States exports to that country consisted of inorganic commodities, while in 1949 less than 10 percent were this type. Exports of organic materials increased over eleven times in the 10 years—from $51,000 to $576,000.

Uruguay—In 1946 it was reported that of Uruguay's consumption of 4,250,000 pounds of pesticides, only 120,000 pounds consisted of organic materials. Complete import statistics are not available, but the United Kingdom outranks the United States as a supplier, particularly of benzene hexachloride. Based on United States exports of organic commodities to Uruguay which rose from $16,000 in 1939 to $130,000 in 1949, it would appear the trend is toward the newer materials. In 1949 only $10,000 worth of inorganic pesticides were shipped.

Venezuela—Venezuela is not a manufacturer of pest control products, but it is reported that consumption increased from 300 metric tons in 1947 to 600 tons in 1949. However, imports (under a general category) in 1948 totaled 1,043 tons, with the United States as the major supplier. According to official data on distribution of insecticides by the Ministry of Agriculture, during half of 1948 about two-thirds of the 150 tons so distributed consisted of organic and the remainder of inorganic materials. In 1939 the United States exported $175,000 worth of pest control products to Venezuela and in 1949, $810,000. In both years a large percentage consisted of organic materials since Venezuela is a large consumer of "household and industrial insecticides." However, in 1949 there was a decided increase in exports of "miscellaneous agricultural insecticides and related materials."

Europe

ACCORDING to available information, Europe is showing a definite trend toward greater production and employment of organic

By
Laura G. Arrington
U. S. Department of Commerce
Chemical Division

Part II

pesticides. The United Kingdom is a large producer of these commodities, and several continental countries also manufacture such products. DDT, benzene hexachloride, and "Methoxone" (a weed killer similar to 2,4-D) are particularly popular, and since World War II their use has steadily risen. Consumption of the old-line chemicals has decreased, but over-all consumption of pest control chemicals is much higher than in the previous decade.

Belgium — In 1939 Belgium imported about 13,500 metric tons of insecticides, practically all consisting of inorganic products. In 1949, approximately 600 tons of new organic pesticides were consumed, half of domestic production. Data on 1949 imports are unavailable, but supplies are obtained from the U. S. with the exception of certain DDT compounds from Switzerland, and BHC from France. In 1939 the U. S. exported $5,433 worth of pesticides to Belgium and in 1949 such shipments totaled $508,000; 86 percent consisted of organic products.

Denmark—This country traditionally has a large output of insecticides, many of which are inorganic products. Production in the year 1948 was valued at $1,307,000 (38 percent organics), an increase of 40 percent over 1947 output. Switzerland and the U. K., as well as the U. S., are sources for import of organic pesticides. U. S. exports of pesticides to Denmark rose from $1,000 in 1939 to $140,000 in 1949, when they consisted entirely of organic materials.

Finland—Production of "insect poisons" in Finland rose from $38,000 in 1939 to $240,000 in 1945 (later data not available) and consisted largely of inorganic products. Imports increased from $115,000 in 1939 to $208,000 in 1946; over half of 1946 arrivals originated in Belgium. In 1946 it was reported that Finland soon would be self-sufficient in pesticides. Lack of dollar exchange precludes imports from the U. S. which dropped from $55,000 in 1939 to $5,000 in 1949.

France — France produces about 80,000 metric tons of copper sulfate annually, a large portion of which is domestically consumed, along with about 60,000 tons of sulfur. Calcium and lead arsenates and sodium fluoride and fluosilicates also are produced. Since the end of World War II, DDT and BHC have been manufactured, with sizable quantities exported to neighboring countries. France is largely self-sufficient in insecticides and, although data are not available, consumption of organics undoubtedly has increased in recent years. In 1949 French exports of prepared insecticides and DDT amounted to $3,915,000 against imports of $435,000.

Germany — Although information on production and consumption of pest control chemicals is not available, much research on new organic materials has been conducted in Germany, both during and since World War II, and the trend is definitely toward use of the new products.

Greece—Prior to World War II, the principal pesticides used in Greece were copper sulfate and sulfur. Prepared insecticides imported in 1938 totaled around 65,000 pounds while imports of copper sulfate were 1,850,000 pounds. In 1949 comparable data were 3,280,000 pounds of preparations, and 1,100,000 pounds of copper sulfate. The U. S. was practically the only supplier of prepared products and the U. K. was the source for the copper sulfate. In the same period imports of sulfur (almost entirely from Italy) dropped from 39,000,000 to 6,000,000 pounds. United States export statistics indicate a large rise in the Greek market for organic pesticides—from $35,000 in 1939 to $1,447,000 in 1949.

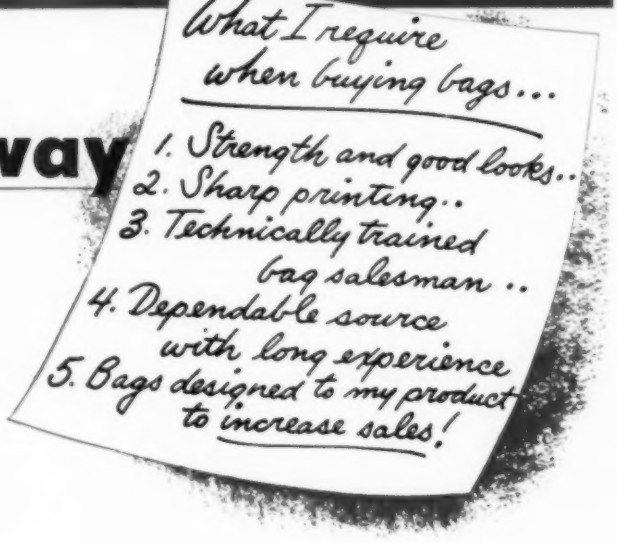
Italy—Italy is a large producer and consumer of copper sulfate. It also uses large amounts of Sicilian sulfur for protection of vineyards. In 1938, sales of insecticides totaled 125,000,000 pounds, less than 3 percent being organic products. However, in recent years the picture has altered, due largely to use of sizable quantities of DDT for control of malaria. The United States is the principal source for organic products; such exports to Italy rose from $35,000 in 1939 to $1,446,000 in 1949, and were $1,110,000 in January-June 1950.

Netherlands — The Netherlands has a sizable insecticide industry and produces DDT, BHC, and other organics. About 3,000 tons of DDT are manufactured annually, but data on output of other organic pesticides are not available. The Netherlands exports dinitro orthocresol, HETP, and BHC. Consumption of all pesticides in 1948 totaled $3,150,000, compared with $645,000 in 1938. Although the Netherlands is not an important market for U. S. pesticides, shipments to that country rose from $22,300 in 1939 to $395,000 in 1949; in both years all exports were organic commodities.

Norway — Norwegian manufacture of organic pesticides is limited to the compounding of imported toxic ingredients; output in 1949 was estimated at 200 metric tons of DDT preparations, 100 tons of BHC, 50 tons of 2,4-D, and small amounts of phosphatic compounds and ANTU. Imports of the toxic materials in 1949 were reported at $211,000, about half of which originated in the U.K. (1939 data not available). However, U. S. exports of pesticides to Norway in 1949 were $141,000 (all organic products), compared with $21,000 in 1939.

Portugal—In 1945 estimated consumption of insecticides in Portugal was 70,000,000 pounds, about

One way to buy bags and the right way


What I require when buying bags...
1. Strength and good looks..
2. Sharp printing..
3. Technically trained bag salesman ..
4. Dependable source with long experience
5. Bags designed to my product to increase sales!

"By Rule of Thumb" may do for some decisions. When buying bags, however, thought should be given to this important purchase. You'll want the container that protects your product . . . that is designed for your product . . . that assures the best acceptance of your product. Call in your Chase Salesman. He's technically trained to analyze your requirements. He's supported by more than a century of experience in providing bags for American industry and agriculture.

BAGS FOR ALL INDUSTRY AND AGRICULTURE

1847

Topmill burlap bags • Saxolin open mesh bags • Paper and Multiwall bags • Cotton bags of all kinds • Combination bags, liners and specialties

for Better Bags...Better Buy Chase

CHASE BAG CO.

GENERAL SALES OFFICES: 309 W. JACKSON BLVD., CHICAGO 6, ILL.

BOISE • DALLAS • TOLEDO • DENVER • DETROIT • MEMPHIS • BUFFALO • ST. LOUIS • NEW YORK • CLEVELAND • MILWAUKEE
PITTSBURGH • KANSAS CITY • LOS ANGELES • MINNEAPOLIS • GOSHEN, IND. • PHILADELPHIA • NEW ORLEANS • ORLANDO, FLA. • SALT LAKE CITY
OKLAHOMA CITY • PORTLAND, ORE. • REIDSVILLE, N. C. • HARLINGEN, TEXAS • CHAGRIN FALLS, O. • WORCESTER, MASS. • CROSSETT, ARK. • SAN FRANCISCO

15 percent consisting of organic products. Although later data are not available, it is believed that the trend is toward the new products, with neighboring European countries as the sources of supply.

Spain — Production of new pest control chemicals amounted to about 3,000 metric tons a year. Out of total consumption of around 35,000 tons in 1949, 15 percent consisted of organic products, compared with 2 percent in 1939.

Sweden — It is well known that Sweden is the world's largest producer of arsenic, a major portion of which is exported. Production and use of organic pesticides is increasing. Swedish output of all insecticides in 1942 totaled 2,475,000 pounds, about 1,200,000 of which were organics. By 1949 output of organic pesticides had risen to close to 6,000,000 pounds. U. S. exports to that country have risen little in the past decade.

Switzerland—Switzerland has a highly developed insecticide industry, manufacturing principally organic products. Use is increasing and exports total from $2,300,000 to $2,750,000 a year. BHC is obtained from the U. K. but importation of DDT is prohibited. Exports from the U. S. to Switzerland—$7,000 in 1939 and $125,000 in 1949—consisted entirely of organic products.

Turkey—In 1946 it was estimated that Turkey consumed about 15,000,000 pounds of agricultural insecticides; only 6 percent consisted of organics. In 1949, 7,000,000 pounds of sulfur and copper sulfate were imported, and 900,000 pounds of DDT preparations were received. In 1939, U. S. exports of pesticides to Turkey totaled slightly less than $75,000, but by 1949 had risen to $716,000, almost half of which was DDT, and the remainder also organic products, indicating a decided trend in this direction. Purchases from the U. S. would have been greater except for lack of dollar exchange.

United Kingdom—The U. K. is the world's second most important producer of pest control chemicals, with a large output of organic commodities. Official data on production and consumption are not available, but exports of these commodities rose from $3,844,000 in 1938 to $11,784,000 in 1949. Foreign markets for "Gammexane" and "Methoxone" are sizable. The trend in both manufacture and consumption is toward organic products, and constant research is conducted on synthetic organic chemicals for pesticides.

Eastern Europe — Although little is known concerning consumption of pest control chemicals in this area, use probably follows the worldwide trend toward organics. In recent years large quantities of DDT have been employed for control of mosquitoes and other household insects. U. S. exports to these countries immediately after World War II—particularly of DDT—were rather heavy; in 1949 around $300,000 worth of DDT was shipped to Bulgaria, Rumania, and Yugoslavia.

Asia and Oceania

IN general, people in this area are not yet educated to the advantages of pest control, but use of insecticides is increasing and the Far Eastern market for U. S. pest control chemicals has risen considerably in the past decade—from $622,000 in 1939 to $4,191,000 in 1949, practically all consisting of organic materials.

Australia—In the fiscal year 1947-48 Australia produced over $4,000,000 worth of pesticides, a large proportion being organic materials. From 400 to 600 long tons of DDT are manufactured annually and more than meet demand. Yearly production of BHC is 250 tons, but imports also arrive from the U. K. As demand rises, production will be increased to meet it, since raw materials are available. During World War II annual consumption of agricultural pest control chemicals was about 11,250,000 pounds, 95 percent consisting of arsenicals and copper sulfate. In more recent years the trend has shifted to the organics, particularly for use in animal dips. Australia never has been an important market for U. S. insecticides.

Ceylon—Little information is available on consumption of pest control chemicals in Ceylon; however, DDT is produced in that island and annual consumption is stated as 500 long tons. United States exports of organic pest control chemicals to Ceylon rose from $5,000 in 1939 to $447,000 in 1949, but dropped considerably in the first half of 1950. Shipments in 1949 were largely DDT and household insecticides.

China—Pest control chemicals are not generally used in China, but farmers are being educated to their importance and consumption probably will increase. In 1950 it was planned to import 2,000 metric tons of DDT and BHC. U. S. exports of organic pesticides to China in January-June 1950 were $93,000 against only $15,000 for the entire year 1949.

India—In 1946 India imported $600,000 worth of pest control chemicals, about 30 percent of which were arsenates and copper sulfate. India is becoming cognizant of the importance of protecting health and crops, and use of pest control products, particularly organic materials, is on the rise. Present consumption of materials for Government antimalaria campaigns, principally DDT, is estimated at 10,000,000 pounds a year, and probably will increase. United States exports of organic pesticides to India rose from $98,000 in 1939 to $201,000 in 1949.

Indonesia — No information on use of pest control chemicals in Indonesia is available, but United States exports of organic pest control chemicals to that area increased from $52,000 in 1939 to $615,000 in 1949, and ran at an even higher rate in the first half of 1950—$382,000. Shipments in 1949 were principally household and industrial insecticides.

Iran—Estimated use of DDT in Iran in 1949 was 100 tons, and for 1950 is 200 tons, with a possibility of 500 tons if full-scale and nationwide malaria control is carried on. United

(*Turn to Page* 120)

RICELAND RICE HULLS

are the perfect conditioner for

Chemical Fertilizers

- ✔ Scientifically dried and ground especially for fertilizer conditioning.
- ✔ Available in fine ground No. 16, medium ground No. 14 and coarse ground No. 12.
- ✔ Used and preferred by leading fertilizer manufacturers.
- ✔ Available in large volume the year 'round.
- ✔ Shipped in bulk or 100-pound burlap bags (25 to 40 tons per car).
- ✔ Very inexpensive.
- ✔ Wire, phone or write for free sample and price.

RICELAND RICE HULL DIVISION

ARKANSAS RICE GROWERS CO-OP ASS'N.

STUTTGART, ARK. • PHONE L. D. 10

World's largest rice growing, milling, storage and marketing organization.

World's largest year 'round supplier of rice hulls to fertilizer manufacturers.

Price relationships of certain

Nitrogen Fertilizer Materials

by

A. L. Mehring & G. A. Bennett

U. S. Department of Agriculture
Bureau of Plant Industry, Soils and
Agricultural Engineering,
Beltsville, Md.

PART II

Solutions

THE delivered costs for solutions reported in Table 3 are for whatever kind of ammoniating liquid the particular mixer was using at that time. A number of companies used more than one kind during the period under review. Different types are customarily used in particular areas, according to which type is available locally, or for various other reasons.

Although ammoniating liquors have been the cheapest sources of nitrogen for making mixed fertilizers in some localities for a long time, they have only recently become so in the far west.

Delivered costs rose 13 cents per unit in the 1940-44 period, as compared with the 5-year prewar average. On the other hand they dropped 9 cents in 1945. Since then, costs rose again until the 1949 average figure is 28 percent higher than the 5-year prewar average.

The average delivered cost ($1.12) was actually 2 cents per unit lower than the published spot quotations, F.O.B. in the 5-year 1935-39 period. Since about 1940, the delivered cost has exceeded the published F.O.B. price and this excess has increased steadily until in 1949 it averaged about 20 cents a unit. This increase in actual cost as compared to published spot prices is believed to be due principally to the change from quoting prices F.O.B. ports to F.O.B. producing plants and also to increased freight rates.

In 1946, the highest delivered cost was $1.28 per unit in the area from Shreveport, La. to Dallas, Texas and the lowest $1.10 at several points close to Hopewell, Va. or Belle, W. Va. The standard deviation from the mean is 4.8 cents. In 1949, delivered costs varied from $1.23 to $1.59 for the same points, with a standard deviation of 7.6 cents. In other words, the range from the minimum to maximum cost has increased from 18 cents in 1946, to 36 cents in 1949. This probably is a reflection of the increased costs of transportation.

Ammonium Sulfate

THE delivered cost of ammonium sulfate (table 3) increased from the 5-year prewar average of $1.27 a unit to $2.57 in 1949 or 102 percent, as compared with only 28 percent for solutions. The increase in the F.O.B. price from $1.26 to $2.29 is 82 percent. Probably most of the difference in increase between delivered and F.O.B. prices is due to increased freight rates, but other factors are involved.

Naturally, delivered costs are lowest in cities that contain by-product coke ovens, such as Buffalo, Chicago, Baltimore, Birmingham, and St. Louis.

Ammonium Nitrate

THE average delivered cost of ammonium nitrate dropped 14 cents per unit of nitrogen in 1944 and remained approximately the same until 1947 when it increased 18 cents. It increased again substantially in both 1948 and 1949, but the average of $2.13 in 1949 is only 31 percent higher than the $1.63 average for 1943.

The lowest-cost localities in this table are high-cost ones for ammonium sulfate. Kansas City, Mo. and Shreveport, La., for instance, are relatively near points producing ammonium nitrate. Comparatively little ammonium nitrate is used in making mixed fertilizers in the northeast,

We supply manufacturers of fertilizers, feeds, chemicals, and pharmaceuticals with raw materials from every corner of the earth. If you have a supply problem, write, wire or phone us today.

H. J. BAKER & BRO.

271 MADISON AVENUE, NEW YORK 16, N. Y.

Branch Offices: Baltimore • Chicago • Savannah • Tampa

where it costs more per unit than the sulfate.

Price Relationships

Liquids vs. sulfate. Liquid forms have been the cheapest sources of nitrogen at most points in the United States since 1926, but not at all points in every year. From 1926 to 1943, the delivered cost of nitrogen in ammonium sulfate was from 4 to 25 cents a unit more than in solutions most of the time and at most points. At Baltimore, Md., Birmingham, Ala. and a few other places, however, where large quantities of by-product ammonium sulfate are produced locally and solutions have to be shipped in, the cost of nitrogen in sulfate was lower in some years.

Since 1944, the spread in unit delivered cost between solutions and ammonium sulfate has increased in every year. Sulfate nitrogen cost from 57 cents to $1.48 more per unit than nitrogen in solutions during 1949. The average difference is $1.13.

Differences in cost between sulfate and liquid forms of nitrogen in 1949 are indicated on the map of the United States in fig. 1. At all points represented in the east the difference exceeded 82 cents. By studying these differences in relation to location of by-product and synthetic ammonia plants, as also shown on the map, it is clear that proximity to a by-product plant means a lower cost sulfate and vice versa. Where a buyer is located at a point with equal freight rates from sources of both kinds of materials, the solutions would still have a decided advantage even if the F.O.B. price were the same on both, because sulfate of ammonia carries 20-7 units, whereas solutions have around 40, and anhydrous ammonia contains 81 units. Freight rates are higher on anhydrous ammonia than on solid fertilizers, but not nearly as much in proportion as the nitrogen content. Therefore, the difference in cost between liquid and solid materials increases rapidly with the distance from sources of supply. The numbers on the map show this. A few exceptions may be due to the fact that shortages or other considerations caused some manufacturers to buy supplies at plants other than the ones closest to them.

Sulfate vs. nitrate. Ammonium nitrate as a separate material was first used in quantity in the preparation of mixed fertilizers in 1943. At that time nitrogen cost more as ammonium nitrate than as ammonium sulfate at practically all points in the United States. In 1944 both forms cost about the same at most places, but at Birmingham, Ala. the sulfate form was cheaper by 17 cents a unit. In 1949, however, the nitrate form was much cheaper delivered to most localities in the South and West and more expensive in the North. A unit of nitrogen as ammonium sulfate cost 31 cents less delivered in Boston, Mass., 26 cents less in Carteret, N. J. and 6 cents less in Buffalo, N. Y. It cost a little more in Sandusky, Ohio, Chicago, Ill. and Birmingham, Ala. but decidedly more at other points. The sulfate form was 82 to 88 cents a unit higher in Shreveport, La. and Dallas, Texas and over one dollar higher in Iowa.

Liquids vs. nitrate. Nitrogen in the kinds of liquid used has been cheaper in all points in every year than in the form of ammonium nitrate. The differences are less at points west of the Mississippi River and greater in the northeast in the last 2 or 3 years, but before 1947, tended to be about 30 cents a unit at most points.

Discussion

IN spite of the high prices of nitrogen in natural organics, some nitrogen in this form is still used, because of the conditioning effect of such materials. Many years ago high grade organics were widely used as conditioners. In 1949, fertilizer grade animal tankage was quoted at $10.73 per unit of nitrogen. The organics that cannot be used as feed are much cheaper. For example, process tankage and sewage sludge sold for $4.76 and $3.93, F.O.B. plant. As a consequence the organics used in the largest tonnages today are very different materials from those commonly used 20 or 30 years ago. In fact many mixed fertilizers today do not contain significant amounts of natural organic nitrogen.

It is common practice to add as much solution nitrogen as possible in making nitrogenous mixtures and then make up the difference with ammonium sulfate or ammonium nitrate, although many other materials are also used.

Because of its hygroscopicity the amount of ammonium nitrate that may be added to mixtures is limited. Nitrogen solutions contain from 55.5 to 67 percent ammonium nitrate. When such solutions are used freely, it may impair drillability to add solid ammonium nitrate also.

On May 15, 1950, the F.O.B. coke-oven price of ammonium sulfate dropped sharply from $2.29 to $1.67 per unit of nitrogen. This 27 percent drop puts ammonium sulfate in a much better competitive position.

When phosphates that cannot absorb free ammonia are used to make mixed fertilizers, the use of solid forms of nitrogen is necessary. The superphosphate required to make a ton of 5-10-5 fertilizer costs about $8.00 at 80 cents per unit. If the use of some other phosphate costing about the same price per unit necessitated the use of 2 units in the form of ammonium sulfate instead of nitrogen solution as the source of the nitrogen, the P_2O_5 would be 23 cents a unit more expensive at last year's average prices, or 10 cents a unit at present prices. If 4 units of solution nitrogen were used, the cost differential in favor of superphosphate would have been 46 cents per unit of P_2O_5 in 1949, and would be 20 cents at present.

Thus, it is clear that as long as solutions containing free ammonia are much cheaper forms of nitrogen, phosphatic materials that cannot be ammoniated, such as calcium metaphosphate, Thermophos, fused phosphate rock and similar materials are not likely to be used in large quantities in the manufacture of mixed fertilizers.

(*Turn to Page 121*)

SABOTEURS in the food industry

1. Rice Weevil—most destructive pest of stored grain. About 1/8" long, reddish brown with 4 light reddish or yellowish spots. Female lays from 300 to 400 eggs in her 4-5 month life. Distribution is world-wide.

2. Buffalo Gnat—Very small with big, round eyes, humped back, and short, piercing-sucking mouth parts. Wings are broad and without hairs or scales. Females are blood-suckers, attacking birds, mammals, and man.

3. Fruit Fly—Very small with large, wide head and large, irridescent greenish eyes. Legs and body are hairy and wings are variable in shape. Blueberries, cherries, and apples are damaged by various species.

4. Silverfish—small, wingless, with 3 long bristles at end of body and very long, many-segmented antennae. Body usually covered with small, silvery scales. They love dark crevices and are usually seen at night.

5. Angoumois Grain Moth — important stored-grain pest. Small, usually dull-colored with narrow fore wings. Females lay an average of 40 eggs, which hatch into larvae that bore into grain kernels and feed on contents.

6. Drugstore Beetle—A general feeder in stored products, including herbs and drugs in pharmacies. 1/10"—1/8" long, cylindrical, and uniform light brown. Body has a downy covering of fine, soft, silky hair.

You'll find these culprits and many others—stealing food, or sabotaging the efficiency of workers—wherever food products are stored, processed, or handled. But they can be dealt with swiftly, effectively and economically with *versatile* Pyrenone-based insecticides.

Whether you formulate oil-type, emulsion, or wettable-powder sprays . . . aerosols . . . or specialty insecticides, Pyrenones in the proper concentrations offer you an ideal base. Pyrenone-type insecticides have attained an important role in the protection of food and food products against destructive insects. In this role they contribute mightily to the defense effort. For further information, write U.S. Industrial Chemicals, Inc., 60 East 42nd Street, New York 17, N. Y. Branches in all principal cities.

Pyrenone*

*Registered trade-mark of U.S.I.

Although all agricultural pesticides are toxic in varying degrees, these materials can be handled without undue danger to persons involved. Here a noted Chicago toxicologist discusses the subject of:

Hazards Involved in Pesticide Application

by

Dr. Julius M. Coon*

Director of Toxicity Laboratory, Medical School, University of Chicago

ALL chemicals used to control pests in agriculture are potentially poisonous to man and domestic animals. The toxic hazards involved in the use of any such agent should be evaluated before it is employed on a large scale. Once these hazards have been assessed and measures for protection have been described, it is then the responsibility of workers employed in field-dispersal operations to acquaint themselves with all information pertaining to the safety of themselves and others.

It is often supposed that the more poisonous a chemical is, the more dangerous it is to work with. This is not necessarily true so far as the field worker is concerned. If a chemical is extraordinarily toxic to the pest, then the formulation that is used will be proportionately dilute and the dangers will be minimized accordingly. A substance that has a high degree of toxicity when injected into an animal may not be absorbed through the skin, and it may be chemically destroyed in the stomach Also its volatility may be low, thus decreasing the vapor hazard. It may have a strong odor and an irritating effect on the skin, eyes, or nose, thus warning of its presence. Recovery from nearly lethal doses may be rapid, as in the case of nicotine, and there may be little or no residual damage to the organs of the body, thus diminishing the chronic hazard.

Conversely, a substance of lesser toxicity will be more dangerous under field conditions if it (1) is rapidly absorbed through the skin, (2) has a high volatility, (3) is stable upon ingestion, (4) does not give warning of its presence by irritation or odor, (5) exerts a subtle prolonged

* From talk presented at Illinois Custom Spray Operators' school, Urbana, Ill., January 18, 1951.

V-C

V-C fertilizers

Complete Fertilizers Superphosphate
Concentrated Superphosphate
Phospho Plaster Sulphuric Acid

V-C phosphate rock products

Phosphate Rock, *Ground and Unground*
Calcined Phosphate Rock Nodulized Phosphatic Materials

V-C cleansers

The Vicar® Line of Cleansers

V-C fibers

Vicara® Textile Fibers
Zycon Fibers

V-C bags

Burlap Bags Cotton Bags
Paper Bags

V-C chemicals

Phosphoric Acids	Trisodium Phosphate	
Phosphorus	Tetrasodium Pyrophosphate	Liquid Sodium Silicates
Calcium Phosphates	Sodium Tripolyphosphate	Nicotine
Disodium Phosphate	Sodium Metasilicate	Tetra Ethyl Pyrophosphate

V-C PRODUCTS

VIRGINIA-CAROLINA CHEMICAL CORPORATION
General Offices: 401 East Main Street, Richmond, Virginia

Black Leaf®

PEST CONTROL PRODUCTS

Black Leaf 40—for spraying fruits, vegetables and flowers, to control aphids and similar sucking insects. Also used to control certain external parasites of cattle, sheep, and poultry—and as a drench for sheep.

Black Leaf Dry Concentrate—a dry powdered nicotine compound that combines the versatility of Black Leaf 40 with the convenience of a dry product.

Black Leaf 155—a "fixed" nicotine compound for spraying apples and pears to control codling moth, also for controlling grape berry moth and citrus thrips.

Black Leaf 10 Dust Base—a "free" nicotine compound, easy to mix with non-alkaline carriers to make a neutral dust.

Black Leaf Garden Dust—a multi-purpose dust or spray containing nicotine, pyrethrum and rotenone—*plus* a concentrated fungicide.

Black Leaf Rotenone Dust—1% rotenone and sulphur, blended on our special carrier material.

Black Leaf Mash-Nic—for controlling the large roundworm (*Ascaridia galli*) in chickens. A "single-shot" treatment.

Nico-Fume Liquid—contains 40% actual nicotine in a "free" form—for greenhouse spraying and fumigating to control aphids and similar sucking insects.

Nico-Fume Pressure-Fumigator—spreads penetrating nicotine fumes under pressure to control aphids and similar sucking insects in the greenhouse.

Benzo-Fume Pressure-Fumigator—for the control of greenhouse red spider mites.

Black Leaf Aerosol Insect Killer—a highly effective aerosol insecticide containing a combination of pyrethrins and piperonyl butoxide. Controls flies, mosquitoes, ants, roaches and similar household insect pests.

Black Leaf 3-5-40 Cotton Dust • Black Leaf 3-5-0 Cotton Dust
Black Leaf Toxaphene-Sulphur Dust • Black Leaf Toxaphene Dust
—for control of boll weevils, aphids, fleahoppers, thrips, boll worms, and certain other insects infesting cotton.

Other cotton insecticide materials available.

"Black Leaf"®

TOBACCO BY-PRODUCTS & CHEMICAL CORPORATION
Richmond, Virginia • San Francisco, California

Factors involved in hazards to applicators and others handling agricultural pesticides include volatility; absorptive properties; the stability of material upon ingestion and how high a concentration must be used for control of insect pests. Table below presents relative hazards of agricultural pesticides widely used

physiologic effect, and (6) must be used in relatively high concentration for pest control. Along with a high intrinsic toxicity, these factors would obviously make an extremely hazardous chemical. The group of insecticides known as the organic polyphosphates (TEPP, HETP, Parathion and C-1014) more nearly fulfill all of these adverse properties than any of the other agricultural chemicals. Special precaution are therefore required in handling these materials.

In the accompanying table an attempt is made to appraise the comparative dangers, under field conditions, of some of the most widely used chemicals. This tabulation demonstrates the "triple threat" nature of the organic polyphosphates, as well as the relatively low hazards attending the use of such materials as methoxychlor, TDE, the pyrethrins, and 2,4-D.

A distinction should be made between the immediate and the chronic hazards involved in the field dispersal of chemicals. Though some agents, such as those with a single + sign in the table, have virtually no immediate effect in the amounts which may be absorbed under practical conditions, there is no substance that will not cause harm following the absorption of small amounts repeatedly over a period of several weeks or months. Measures must therefore be taken to protect against skin contact, inhalation, and ingestion of any agent which is being used continuously over a period of time.

Attention should also be given to the possible toxicity of the solvent or diluent used in a formulation. Though these are generally of low basic toxicity, they are sometimes present in such high concentration as to constitute a real hazard. The kerosene, for example, which has been used as a solvent for DDT and some of the other chlorinated hydrocarbons, is far from innocuous and has been responsible for several cases of poisoning. Solvents of this nature also promote a more rapid absorption of the basic ingredient through the skin.

Every individual working in the vicinity of a spraying operation should know what spray is being used and should show his respect for its hazards by following the directions for protection. If he does this, he is not in danger of being poisoned. None of the agricultural chemicals has dangerous properties against which a worker cannot be completely protected.

References

1. *The Toxicology of the Newer Agricultural Chemicals.* A. J. Lehman, Bulletin of the Association of Food and Drug Officials, *12*, 82, 1948.
2. *The Major Toxic Actions of Insecticides.* A. J. Lehman, Bulletin of the New York Academy of Medicine, *25*, 382, 1949.
3. *Pharmacology and Toxicology of Certain Organic Phosphorous Insecticides.* A symposium, Journal of the American Medical Association, Sept. 9, 1950, *144*, 104, 1950.
4. *Food Contamination From the New Insecticides.* K. P. DuBois, Journal of American Dietetic Association, *26*, 325, 1950.

Table 1

Relative Hazards of Chemicals

	Skin absorption	Inhalation	Ingestion
TEPP	++++	++++	++++
HETP	++++	++++	++++
Parathion	++++	++++	++++
C-1014 (Pestox3)	++++	++++	++++
Aldrin (Compound 118	+++	+++	++
Dieldrin (Compound 497)	+++	+++	++
Chlordane	+	+	+
DDT	+	+	+
TDE	0	+	0
Toxaphene	+	+	++
Methoxychlor	0	+	0
Benzene hexachloride	++	++	+
Nicotine	++	++	++++
Rotenone	0	++	0
Pyrethrins	0	+	0
2,4-D	0	+	+

THOMPSON-HAYWARD

FARM-TESTED CHEMICALS

PHENACIDE
(TOXAPHENE)
TOXICHLOR
(CHLORDANE)
DED-WEED
(2, 4-D)
DED-TOX
(DDT)
TRI-6
(BHC)

Insecticides and herbicides are already in use in many areas. Within the next thirty days the season will be in full swing. It is vitally important that you maintain a good stock at all times, since basic chemical shortages may mean slow deliveries. Check your present stocks now and send your orders in at once. We will make every effort to see that you get the supplies you need—but we can only do this if you keep us advised well in advance as to your requirements.

THOMPSON-HAYWARD CHEMICAL COMPANY

AGRICULTURAL DIVISION KANSAS CITY, MISSOURI

MINNEAPOLIS • OKLAHOMA CITY • N. LITTLE ROCK • SAN ANTONIO • DES MOINES • DAVENPORT • NEW ORLEANS
ST. LOUIS • HOUSTON • DALLAS • WICHITA • MEMPHIS • CHICAGO • OMAHA • DENVER • TULSA

Newer pesticides discussed at Midwest

SHADE TREE CONFERENCE

USE of 2,4-D to kill rather large trees is possible, provided a proper application technique is employed, a Michigan State College scientist asserted at the 6th Midwest Shade Tree Conference in Chicago, Feb. 14 to 16. In a talk on "Some Aspects of the Use of 2,4-D in Arboriculture," Prof. B. H. Grigsby, of the department of botany and plant pathology at MSC, said the compound should be applied in a band, 18 to 24 inches wide, near the base of the tree, as a dormant treatment.

Oak trees, eight to ten inches in diameter have been killed by this method, he said, adding that it is possible to kill large trees of other species the same way. One big advantage for tree care men working in parks, cemeteries, city homes and estates, he pointed out, is that there will be little or no drift, so that sensitive surrounding vegetation will not be endangered.

Use of 2,4-D for control of woody vegetation is increasing, Prof. Grigsby told the tree men. On small brush he recommended an overall spray application to reach all tissues above ground. On tall woody vegetation, however, thorough spraying is not possible in confined areas where drift is a problem. Under such conditions, he said, application of spray by the dormant basal treatment is advisable.

To control weeds in turf in wooded areas of parks, cemeteries, etc., late fall application was recommended. Surrounding vegetation, which might be injured by drift, is then in the most resistant stage, and possibility of injury is reduced, he said. If the weed still has the necessary leaf surface to receive adequate spray, fall application when temperatures are low, makes it possible for the 2,4-D to move deeper into the roots, thus making kill more certain. Dandelions in turf had been effectively killed at Lansing as late as November, he said.

Much needed information on use of 2,4-D on woody plants is still lacking, Prof. Grigsby warned the arborists and since many plants and trees are exceedingly sensitive to the compound, the possibility of serious consequences from drift should always be considered.

Effects do not always show up immediately, he said. Contact with the herbicide may have occurred in one season, during the budding period, yet signs of the effects may not become obvious until a year later. If, however, the delayed effect is confined to leaf modifications, the plant will generally recover. Since so many ornamental trees and shrubs are so susceptible, he suggested that spray applications be made before the budding season.

In research at the University of Wisconsin to develop means for control of the oak wilt virus, Prof. James E. Kuntz of the department of plant pathology said they have been trying to reduce an infected tree's potential for spreading the disease to nearby healthy trees, by killing the immediately adjacent healthy trees with ammate or sodium arsenite.

Prof. Kuntz also announced the discovery that oak trees of given species form natural root grafts, so that several trees in close proximity may be linked together through their underground root systems. He told how radio-active isotopes in dyes have been used to demonstrate the course of liquids from tree to tree through these natural root grafts. The discovery, he said, suggests one way whereby the transfer of the oak wilt virus is effected.

In many suburban communities along the lake shore north of Chicago, extensive use is being effectively made of chemicals for control of mosquitoes, the arborists were told by Thomas J. Lynch, arborist of Winnetka, Ill. He reviewed the experiences of the North Shore Mosquito Abatement District in use of DDT, DDD, TDE, rhothane, dieldrin and other compounds. No adverse effects have been reported on humans, he said.

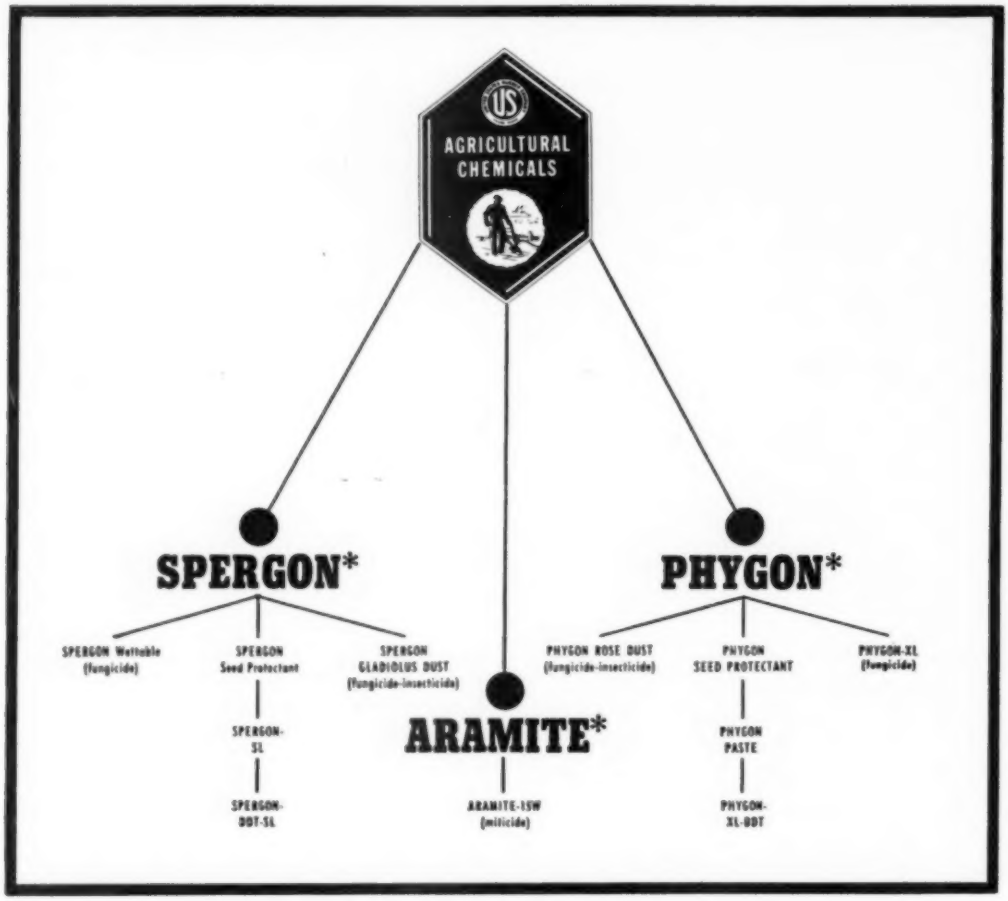
The current status of control measures against Dutch elm disease now infesting the midwest, was reviewed by Roger U. Swingle, of the U.S.D.A. division of forest pathology while another contribution to entomological phases of tree care was made by J. E. Bussart, Velsicol Corp. entomologist, Chicago.

In his paper on "Scale Insects and Control Methods," Dr. Bussart asserted that scale insects are among the most destructive pests of ornamentals and trees. This is not generally recognized, he declared, because the tree or shrub is usually dead before the true cause of its demise is discovered.

Control methods, he said, require a knowledge of the life history and development of each species of scale insect. He found only three agricultural stations doing work in this field and two of these projects were semi-dormant. A fourth study is, however, just being started at the Waltham, Mass., station, he said.

The San Jose scale, whose female may have from 10 to 30 million progeny, is one of the most destructive scale insects, he asserted. The life history and control measures for this pest were recorded, also for others including the Forbes, oyster shell, European elm, scurfy, cottony maple, brown elm, terrapin and pine leaf scales. Among factors causing failure to effect control, he cited in-

(*Turn to Page* 110)



The Naugatuck Family Tree Bears Fruit For All

With due modesty, but not without pride, do we of Naugatuck speak of the many benefits made possible by our agricultural chemical products.

To farmers, growers and canners, they have helped to bring better crops, finer produce. To our suppliers and distributors... to the seed processors and all others our products serve, they have contributed a new source of business and profit.

Needless to say, this is a great source of satisfaction to us—and an incentive to discover and manufacture even finer products for the future.

*Reg. U. S. Pat. Off.

UNITED STATES RUBBER COMPANY

NAUGATUCK CHEMICAL DIVISION **NAUGATUCK, CONN.**

Also manufacturers of *insecticides*—Synklor-48-E, Synklor-50-W—*weed killers*—Tufor-40.

Here is described a new technique for the preparation of a uniformly-impregnated concentrate of BHC and DDT. Active material is diffused completely through mass of carrier.

BHC-DDT Dust Preparation

by

Kenneth K. Krausche, Gordon R. Evans and Murray Zakheim

Technical Advisor, Agricultural Chemicals Dept.; Senior Chemical Engineer; and Research & Development Div., Respectively, Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

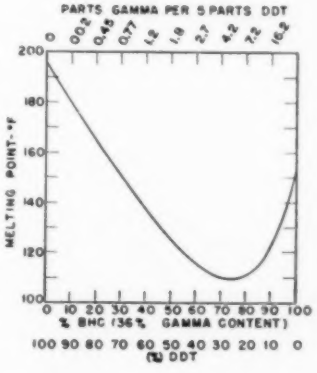
DISCOVERY of new and more powerful pesticidal chemicals has emphasized need for improved and more economical formulation methods productive of more effective finished dusts. Recognition of this fact has led to the development of an entirely new method for the preparation of a uniformly impregnated BHC-DDT dust concentrate employing a mixture of these components with certain eutectic-like characteristics.

The procedure was developed by the Pennsylvania Salt Manufacturing Company and is now in large scale use at its new Montgomery, Ala., plant and in the plants of several customer manufacturers. A patent application is now pending, covering both the procedure and the resultant improved conditions.

It is apparent that the active ingredients in effective pesticidal dusts should be dispersed properly and in a finely divided and available state for maximum potency. Today, the so-called impregnated dusts are being used in increasing quantities, and results of field testing programs indicate that they are more efficient than mechanically-mixed dusts. The term "impregnated dust" refers to one in which the active pesticide permeates or completely pervades the inert carrier or diluent. This may be accomplished by addition of the active ingredient in the liquid phase, either by melting or with the assistance of a suitable solvent if the material is normally a solid. The relatively high melting points of many of the organic pesticides have heretofore limited the application of molten material from the mechanical standpoint and because of the risk of decomposition or deterioration at higher temperatures.

After liquefaction, the active material, upon being properly introduced in this form, will spread or diffuse completely through the mass of the carrier. Such a batch is completely homogeneous and every particle presumably an active particle, as compared to mechanically mixed batches comprising mixtures of discrete particles and agglomerates, some of which are active and some inert.

Figure 1



Effective on Cotton Pests

FOR the control of insect pests on cotton, one of the most effective and widely used dust formulations contains a combination of three percent of the gamma isomer of benzene hexachloride and five percent of DDT. This product is popularly referred to as 3-5-0. Benzene hexachloride is effective against the boll weevil, but not the bollworm. DDT, on the other hand, is effective against the bollworm, but not the boll weevil. Together they can control most of the insect enemies of cotton. Sulfur to the extent of forty percent, is sometimes incorporated in the BHC-DDT combination because it is effective against the red spider. This product is called 3-5-40.

Technical BHC is not a single pure chemical entity, but rather a mixture of substances each of identical molecular formula $C_6H_6Cl_6$ (properly hexachlorocyclohexane), but different in internal structure or configuration of the constituent atoms. These are called isomers, identified by

the Greek letters—alpha, beta, gamma, delta and epsilon. It is the gamma isomer which possesses insecticidal properties useful to agriculture. Technical BHC also contains certain quantities of over-chlorinated materials such as heptachlorocyclohexane and octachlorocyclohexane.

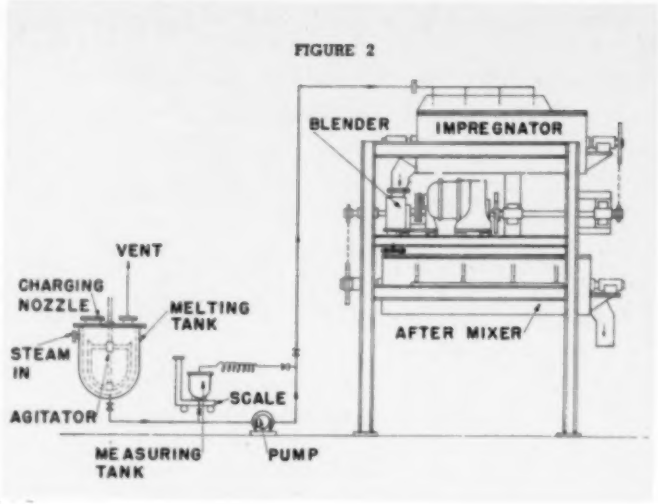
The new technique of producing BHC-DDT dusts is made possible by the availability of a partially refined technical BHC containing approximately 36% of the gamma isomer. This material was introduced by Pennsalt and has been marketed by this company for approximately four years. The 36% technical material is produced by removal of relatively large portions of the alpha and beta isomers, which elimination effects a major improvement in its characteristics.

The importance of the higher gamma concentration BHC lies in its physical properties, which are quite different from those of the usual technical BHC. Since BHC is a mixture of isomers, it does not have a definite and sharp melting point, but rather, softens and melts over a temperature range. DDT is also a mixture of isomers and the *setting* point, instead of the melting point, is used as a specification criterion.

When 36% gamma technical BHC is added in small quantities to technical DDT, the melting range of the mixture is lower than that of DDT itself. Likewise, when DDT is added in small quantities to the BHC, the melting range is depressed. If a continuous curve is plotted representing the melting points, determined by the melting point block method, of various solidified blends of this 36% gamma technical BHC and technical DDT in various proportions, the curve will exhibit a definite low melting point as illustrated in Figure 1.

Fortunately, the relative proportions of BHC and DDT comprising this low melting point mix are not far removed from those required for commonly used insecticide dusts such as 3-5-0 and 3-5-40. Therein lies the advantage of its utilization since liquefaction may be accomplished at nominal temperatures with no danger of degradation.

FIGURE 2



Sprayed on to Carrier

ANOTHER somewhat peculiar property of this mixture facilitates handling and also improves the quality of finished dust. Supercooled to room temperature, it will not solidify for a period of 72 hours. As a matter of fact, even under these conditions, true characteristics of a solid phase are only produced by intermittent stirring with repetition of subsequent warming and cooling operations. The advantage afforded by this latter property is obvious—the molten mixture of active ingredients can be stored for a limited time, handled without heating, and yet is sprayable in liquid form onto the carrier dusts where it will eventually harden (without volatilization of any solvent) to form a solid active ingredient.

The mixture is well adapted to volumetric measurement due to the

(*Turn to Page* 117)

Figure 2 (above): Schematic arrangement of equipment for impregnating DDT-BHC dusts.

Left: View of blenders and ventilating equipment in the new Montgomery, Alabama, insecticide plant of Pennsylvania Salt Mfg. Co.

The Listening Post

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Dr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

ACCORDING to reports by L. F. Curl, in charge of the Bureau of Entomology and Plant Quarantine's Division of Pink Bollworm Control, the spread of that insect in 1950 was a costly matter and presents a problem that is of concern not only to cotton growers in the infested areas but also to those in all other cotton-growing states. Not only did the insect spread to new areas, but it reappeared last year in many counties of northwest Texas and in southwest Oklahoma.

At the present time, a total of 171 counties in Texas are under quarantine because of the pink bollworm, 44 having been added to the quarantined area as a result of the insect's spread in 1950. Five counties in southeastern Arizona and all the cotton-growing counties of New Mexico are under regulation because of this pest. In Oklahoma, 12 southwestern counties are under quarantine, 4 of these having been added as a result of pink bollworm findings in 3 new counties in 1950. In southwestern Louisiana there are 12 parishes under quarantine, although pink bollworms were found in only 4 of them.

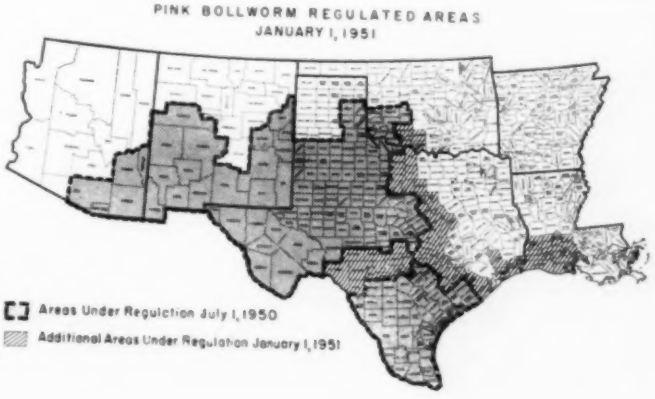
Pink bollworm larvae entered hibernation in the Lower Rio Grande Valley of Texas and Mexico in much smaller numbers in the fall of 1950 than in the previous year. The same was true in Nueces County, Texas, an area from which much spread of the insect occurred last year. These reduced populations of hibernating larvae are attributed to the fact that the destruction of cotton stalks in those areas was accomplished early in the fall of 1950. Reports through early February indicated that the hibernating larvae had suffered little winter mortality thus far, although there is still hope that weather conditions unfavorable to the insects may occur and further reduce their numbers.

New Grasshopper Bulletin

THE latest recommendations for grasshopper control are given in a new USDA publication issued in February by the Bureau of Entomology and Plant Quarantine. Known as "Program Aid No. 149," this publication is entitled "Grasshopper Control with Aldrin, Chlordane, and Toxaphene." It includes directions for the use of these materials in sprays, dusts, and wet or dry baits. The dosages recommended were endorsed by the State Leader's Advisory Committee on Grasshopper Control at a meeting held in Denver, December 14-15, 1950. Copies are available from the Division of Grasshopper Control, 131 Speed Boulevard, Denver 3, Colorado, or from the Bureau of Entomology and Plant Quarantine, Washington 25, D. C.

ALFALFA weevil caused serious widespread damage in Utah during 1950, according to reports recently received. Most of the injury to first-crop alfalfa occurred before the plants were sufficiently mature to cut for hay. Retardation of the second growth continued to be a serious problem. Although weather conditions during the harvest periods were more favorable to good cultural control than in the three previous years, the prevailing high population level and the occurrence of more than the usual number of egg-laying adults on the second growth indicate that large weevil populations may continue in 1951, with consequent severe crop damage in that area.

Reports from North Dakota indicate that cool weather throughout the spring and summer of 1950 retarded development of the wheat stem sawfly and also delayed wheat harvest. An increase in sawfly damage in 1950 over that of the previous two years is attributed to the delay in harvest. The late harvest also prevented much of the wheat stubble from being cultivated in the fall, resulting in a condition which will per-


PINK BOLLWORM REGULATED AREAS
JANUARY 1, 1951
Areas Under Regulation July 1, 1950
Additional Areas Under Regulation January 1, 1951

APPLE
Aphids
Bud moth
Codling moth
Forbes scale
Grasshoppers
Leaf rollers
Mealybug
Mites
Plum curculio
Red bug
San Jose scale
Scurfy scale
Tortrix

PRUNE & PLUM
Aphids
Bud moth
Leafhoppers
Leaf roller
Mealy plum louse
Mites
Plum curculio
Tortrix

CHERRY
Aphids
Bud moth
Cankerworm
Cherry fruitworm
Mites
Oriental fruit moth
Plum curculio
Tortrix

STRAWBERRY
Aphids
Leaf roller
Red spider mite

PEACH
Cat-facing insects
Cottony peach scale
Fruit tree leaf roller
Mites
Oriental fruit moth
Peach tree borer
Plum curculio
San Jose scale

PEAR
Codling moth
Mealybug
Mites
Pear psylla
Woolly apple aphid

APRICOT
Aphids
Bud moth
Codling moth
Leaf roller
Mites
Oriental fruit moth
Tortrix

CABBAGE, BROCCOLI, BRUSSELS SPROUTS, KALE, MUSTARD, TURNIP, Etc.
Aphids
Armyworms
Cabbageworms
Thrips

EGGPLANT
Aphids
Leaf miner

SPINACH
Aphids

ONION
Thrips

CELERY
Aphids
Celeryworms

CUCUMBER, SQUASH & MELONS
Aphids
Cucumber beetle
Melonworm
Pickleworm
Serpentine leaf miner

PEA
Aphids

PEPPER
Aphids
Serpentine leaf miner

PARATHION
The ONE Insecticide for MANY Pests

AVAILABLE FROM NATIONAL MANUFACTURERS

AMERICAN Cyanamid COMPANY
Manufacturer of
Thiophos® Parathion Technical
Agricultural Chemicals Division
30 Rockefeller Plaza, New York 20, N. Y.
Write for Parathion Growers Handbook

GRAPE
Leaf folder
Mealybug
Mites

BLUEBERRY
Maggot
Thrips

WALNUT
Aphids
Codling moth
Red spider

BEANS
Aphids
Armyworms
Leafhopper
Leaf miner
Leaf roller
Mexican bean beetle
Red spider mites

POTATO & TOMATO
Aphids
Colorado potato beetle
Flea beetle
Grasshoppers
Leafhopper
Serpentine leaf miner
Whitefly

CORN
Armyworms
European corn borer
Grasshoppers

BEET
Aphids
Webworm

CARROT
Aphids

ARTICHOKE
Aphids
Plume moth

OKRA
Aphids

LEGUMES
Aphids
Armyworms
Blister beetle
Grasshoppers

ORNAMENTALS
Aphids
Leafhoppers
Mealybugs
Scales
Spider mites
Whiteflies

PINEAPPLE
Mealybug

CITRUS
Black scale
California red scale
Citricola scale
Cottony-cushion scale
Florida red scale
Mealybugs
Purple scale
Snow scale
Thrips
Yellow scale

SMALL GRAINS
Greenbug

PEANUT
Velvetbean caterpillar

SUGARBEET
Aphids
Webworm

HOPS
Aphids
Red spider

TOBACCO
Aphids
Green June beetle grubs
Midge
Suckfly

OLIVE
Black scale
Oleander scale
Parlatoria scale

COTTON
Aphids
Fleahopper
Red spider mites
Webworm

mit a greater percentage of the overwintering larvae to survive. This could result in an increase in the sawfly population during 1951.

The sugarcane borer is reported to have caused less injury to sugarcane in Louisiana in 1950 than had been expected. The dusting of some 62,000 acres with cryolite or ryania, effectiveness of egg parasites, and hot dry weather which occurred during the summer are credited with holding down the extent of damage. A survey last fall, made by Bureau workers in cooperation with those of the Louisiana Agricultural Experiment Station, showed an average of 12.8 percent of the joints bored as compared with 14.7 percent for the period 1935-50. It has been estimated that the crop loss in Louisiana in 1950 due to the sugarcane borer approximated $6,700,000.

Reports of a survey toward the middle of February, which covered 15 counties of Oklahoma, indicate that greenbug infestations in the wheat-growing areas of that state appear to be on the increase despite extremely cold weather. Heavy infestations were observed in western Caddo and in eastern Washita and Kiowa Counties. Some of the wheat in those areas was apparently already infested heavily enough to justify control measures.

1949, '50 Fungicide Tests Reported

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

THE growing of tomato seedlings (transplants) for early-spring shipment to northern tomato-producing regions is an important industry in southern Georgia. One of the problems of this industry is to obtain transplants free from disease.

Huey I. Borders reports fungicide tests conducted jointly for several years at the Georgia Coastal Plain Experiment Station by the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, the Georgia Coastal Plain Experiment Station, the Georgia Agricultural Experiment Station, and the Georgia Department of Entomology, specifically for the control of infection by the fungus *Alternaria solani*, which causes a leaf spot and stem canker of the seedlings. In recent years, infection during the regular spring transplant-growing season had not been sufficient to give clear-cut differences in control by the various materials tested. Therefore, additional fungicide tests were planned for the summer months.

Summer Fungicide Tests

PREVIOUS tests had shown that the extreme heat in southern Georgia caused uneveness of stands of seedlings from field-sown tomato seed. It was decided therefore to set out small transplants, which would have a better chance of becoming established before the onset of the high summer temperatures.

Because of the exploratory nature of the first summer tests, only a small area was prepared for the plots, and the treatments were limited to four sprays. No dusts were used. Transplants of the Rutgers variety were set out on June 7, 1949, and treatments were replicated four times in randomized blocks. The sprays were applied at seven-days intervals from June 28 to August 9, with a power sprayer at approximately 400 pounds' pressure.

No Alternaria blight or any other diseases were observed until the last half of July. By the first week in August the plants in the check plots were severely infected and the differences in protection afforded by the

TABLE 1.

Tomato fungicide test, summer 1949.

Treatment—Material and amount used per 100 gallons[a]		Number leaflets infected Total	Percent of leaflets infected Mean	Mean	Number stem and petiole lesions Total	Mean	Degree of infection[b]
1—							
Nabam (Dithane							
D-14	2 qt.						
Zinc sulfate	1 lb.	143	36	6.04	6	2	.5 to 1
Lime	½ lb.						
2—							
Ziram (Zerlate)	2 lbs.	152	38	6.52	17	4	.5 to 1
3—							
Tribasic copper sulfate	4 lbs.	1662	416	62.20	128	32	3.5
4—							
Phygon XL	1 lb	1886	472	58.92	203	51	3
5—							
Check		3534	884	97.87	1124	281	5
Least significant difference at .05 level			131.62	11.93		60.02	
Least significant difference at .01 level			184.54	16.73		84.16	

[a]Calcium arsenate was used as the insecticide at 4 pounds per 100 gallons in all sprays and on check. Rate of application: 125-150 gallons of spray per acre.

[b]Degree of infection of plants by *Alternaria solani* based on a scale of 0, 1, 2, 3, 4, 5, in which 0 means complete control and 5 indicates severe infection of plants.

Reputation...

built on 40 years of service to agriculture

Many of our present customers were among our first ones over forty years ago, and they often remark that one thing about us has never changed: the Ashcraft-Wilkinson reputation for reliable service.

Users and manufacturers of agricultural insecticides everywhere know that Ashcraft-Wilkinson stands squarely behind every product sold. Our own laboratory, located near the source of raw materials, enables us to analyze and certify chemicals as to formula and content before distribution to the insecticide formulators. Good service is further assured by our several conveniently located branches.

Today, with agriculture again assuming so vital a role in the national effort, Ashcraft-Wilkinson stands ready to provide—as always—the most complete, dependable service on the finest quality chemicals for agricultural insecticides:

TOXAPHENE 40% • BHC • ALDRIN • PARATHION • DDT • SULPHURS • CHLORDANE • DIELDRIN

A Complete Line of Diluents: Talc, Pyrophyllite, Clay, Fuller's Earth

ASHCRAFT-WILKINSON CO.

Home Office

ATLANTA, GEORGIA

Cable Address ASHCRAFT

NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA. • GREENVILLE, MISS.

various materials were beginning to show. Alternaria spread rapidly throughout the plots from this time on, and by August 11, the check plots were almost completely "burned up" by the disease.

On that date the leaflets infected by Alternaria and the lesions on stems and petioles were counted. The results of these counts are shown in Table 1.

As shown in the table, materials can be grouped according to their effectiveness in controlling Alternaria blight. The amount of disease in the plots sprayed with any one of the four materials tested was significantly less than in the checks. There are also significant differences between the sprays in the group giving the best control. Treatments Nos. 1 and 2, and those in the second group, Nos. 3 and 4. The differences between the materials in the first group and those in the second group were really greater than appear in Table 1. The reason for this is that in making counts of infected leaflets a leaflet having one small Alternaria lesion was counted as one, and the same value was given to a leaflet covered with the lesions. The foliage of the plants in the plots sprayed with materials Nos. 1 and 2 was so free from disease that a minute inspection of both surfaces of each leaflet was necessary in order to find such Alternaria lesions as existed. On the other hand, lesions on the leaflets of the plants treated with materials Nos. 3 and 4, and in the checks, were so numerous that counting the infected leaflets required but a glance at each leaflet.

1950 Summer Tests

FUNGICIDE tests of the summer of 1950 were conducted with the same variety and in the same manner as those of the summer of 1949, but on a larger scale. Both sprays and dusts were tested. Applications were made at seven-day intervals from June 13 to July 25, 1950.

Although a few Alternaria lesions were found in some of the plots on June 26, the spread of the disease was slow and the attack did not become heavy until the middle of July. However, the disease steadily increased until the checks and the poorer fungicide plots were almost completely destroyed by the time the test was terminated on August 1, 1950.

The data were recorded and tabulated in the same manner as those from the 1949 test (Table 1). Data on leaf spotting were based on counts made of lesions on 15 compound leaves taken from each of the six middle plants of each plot. Statistical analysis of these data shows that there were highly significant differences in the effectiveness of many of the materials used. Although on a larger scale than the tests of 1949, these experiments yielded comparable

(*Turn to Page* 116)

TABLE 2.

All spray and dust tests for control of tomato plant diseases, summer 1950.

Treatment—	Number leaflets infected Total	Percent of leaflets infected Mean	Number stem and petiole lesions Mean	Number stem and petiole lesions Total	Number stem and petiole lesions Mean	Degree of infection [c]
SPRAYS						
1— Nabam (Dithane D-14), 2 qts. Zinc sulfate, 1 lb. Lime ½ lb.	431	108	13	28	7	.5 to 1
2— Ziram (Zerlate) 2 lbs.	991	248	28	41	10	1 to 1.5
3— Zineb (Dithane Z-78) 2 lbs.	1238	310	32	129	32	1 to 2
4— Tribasic copper sulfate 4 lbs.	1526	382	41	111	28	2
5— Copper CPd "A" 4 lbs.	2045	511	48	177	44	3
6— Zineb (Parzate) 2 lbs.	3549	887	80	1591	398	4
7— Phygon XL 1 lbs.	3979	995	87	2664	666	5
DUSTS [b]	—					
8— Ziram (Zerlate 10 - 20 - 70	4131	1033	99	1609	402	5
9— Zineb (Dithane Z-78) 10 - 20 - 70	4243	1061	96	2637	659	5
10— Tribasic copper sulfate 14 - 20 - 66	4345	1086	97	1562	391	5
11— Phygon XL 10 - 20 - 70	4464	1116	100	5901	1475	5
12— Check 0 - 20 - 80	4773	1193	100	10,995	2749	5
Least significant difference at .05 level		142.56	10.93		439.06	
Least significant difference at .01 level		191.30	14.66		589.16	

[a] Calcium arsenate was used as the insecticide at 4 pounds per 100 gallons in all sprays and on check. Rate of application: 125-150 gallons of spray per acre.

[b] Dusts: formula represents percent by weight of fungicide, insecticide, and filler. Rate of application: 30 pounds per acre.

[c] Degree of infection of plants by *Alternaria solani* based on a scale of 0, 1, 2, 3, 4, 5, in which 0 means complete control and 5 indicates severe infection of plants.

SURE IT'S PRIZE-WINNING COTTON!

—he used a fertilizer containing Sul-Po-Mag®

Of course your farm customers won't expect cotton quite this big, but they can expect larger acre yields, bigger, more uniform bolls, and earlier maturity when they use a fertilizer containing *Sul-Po-Mag* on magnesium-deficient soils.

Cotton planters know that the application of plenty of magnesium is the most effective way to prevent red rust, the common symptom of magnesium deficiency. And thousands of them have found that the most practical and economical way to supply this vital nutrient is to use *Sul-Po-Mag*, the properly balanced, natural combination of magnesium and potash in water-soluble form and immediately available to the plant.

Sul-Po-Mag is produced exclusively by *International* at Carlsbad, New Mexico, and is used by many leading fertilizer manufacturers in their premium grades. More and more farmers are asking for *Sul-Po-Mag* by name. So be sure to include it in your fertilizer mixtures . . . you'll be doing your customers a real service, and building additional profitable volume for you in the future.

SUL-PO-MAG (Water-Soluble Double Sulfate of Potash-Magnesia)
MURIATE OF POTASH • SULFATE OF POTASH

Sul-Po-Mag®
Water-Soluble
Double Sulfate of Potash-Magnesia

INTERNATIONAL POTASH

POTASH DIVISION International Minerals & Chemical **INTERNATIONAL MINERALS & CHEMICAL CORPORATION**
General Offices: 20 North Wacker Drive, Chicago 6

GET READY TO SHUT 'EM OUT

with

GEIGY'S

SPRAYS

GY-PHENE 40-20 COTTON SPRAY—(emulsifiable solution—4 lbs. toxaphene—2 lbs. DDT per gal.)

GY-PHENE E40 and E60—(emulsifiable solutions—4 lbs. and 6 lbs. toxaphene per gal.)

GEIGY ALDRIN "25E"—(25% aldrin emulsifiable solution- 2 lbs. aldrin per gal.)

GEIGY "10-20" COTTON SPRAY—(emulsifiable solution—1 lb. aldrin, 2 lbs. DDT per gal.)

GEIGY E25—(25% DDT emulsifiable solution—2 lbs. DDT per gal.)

DUSTS

GEIGY 3-5 COTTON DUST—(3% BHC—5% DDT)

GEIGY 3-5-40 COTTON DUST—(3% BHC—5% DDT —40% sulphur)

GY-PHENE "20"—(20% toxaphene dust)

GY-PHENE "205"—(20% toxaphene dust with sulphur)

GEIGY 2½% ALDRIN DUST

GEIGY 2½% ALDRIN—5% DDT DUST

GEIGY 2½% ALDRIN—5% DDT—40% SULPHUR DUST

Also available: alternate products, including chlordane formulations and calcium arsenate, should national supplies of the above materials become depleted.

ORIGINATORS OF Geigy DDT INSECTICIDES

GEIGY COMPANY, INC. 89 BARCLAY ST., N. Y. 8, N. Y.

Aberdeen, N. C.; Burlington, Iowa; Colorado Springs, Colo.; Elkton, Md.; Fresno, Calif.; Houlton, Me.; Leland, Miss.; McGregor, Tex.; Orlando, Fla.; Walla Walla, Wash.

Dealer & Distributor Inquiries Invited

NOW...IMPROVED SOLVENTS FOR YOUR

Bug Killers!

S/V SOVACIDES Available for All Types of Insecticidal Preparations

From now on, you can get even better aromatic oil solvents for your insecticides – to make them even more effective for both outdoor and indoor use.

The S/V Sovacides – *Grade AA insecticides in themselves with high knock-down powers* – have been still further improved as insecticidal solvents.

S/V SOVACIDE 544C– the base solvent for insecticidal concentrates – has a higher flash point, and higher solvent capacity than ever before. It holds insecticides in solution more effectively at low temperatures. Ideal for low-pressure aerosol bombs.

S/V SOVACIDE F– for outdoor thermal aerosol fogging – is approved and used extensively by experienced operators.

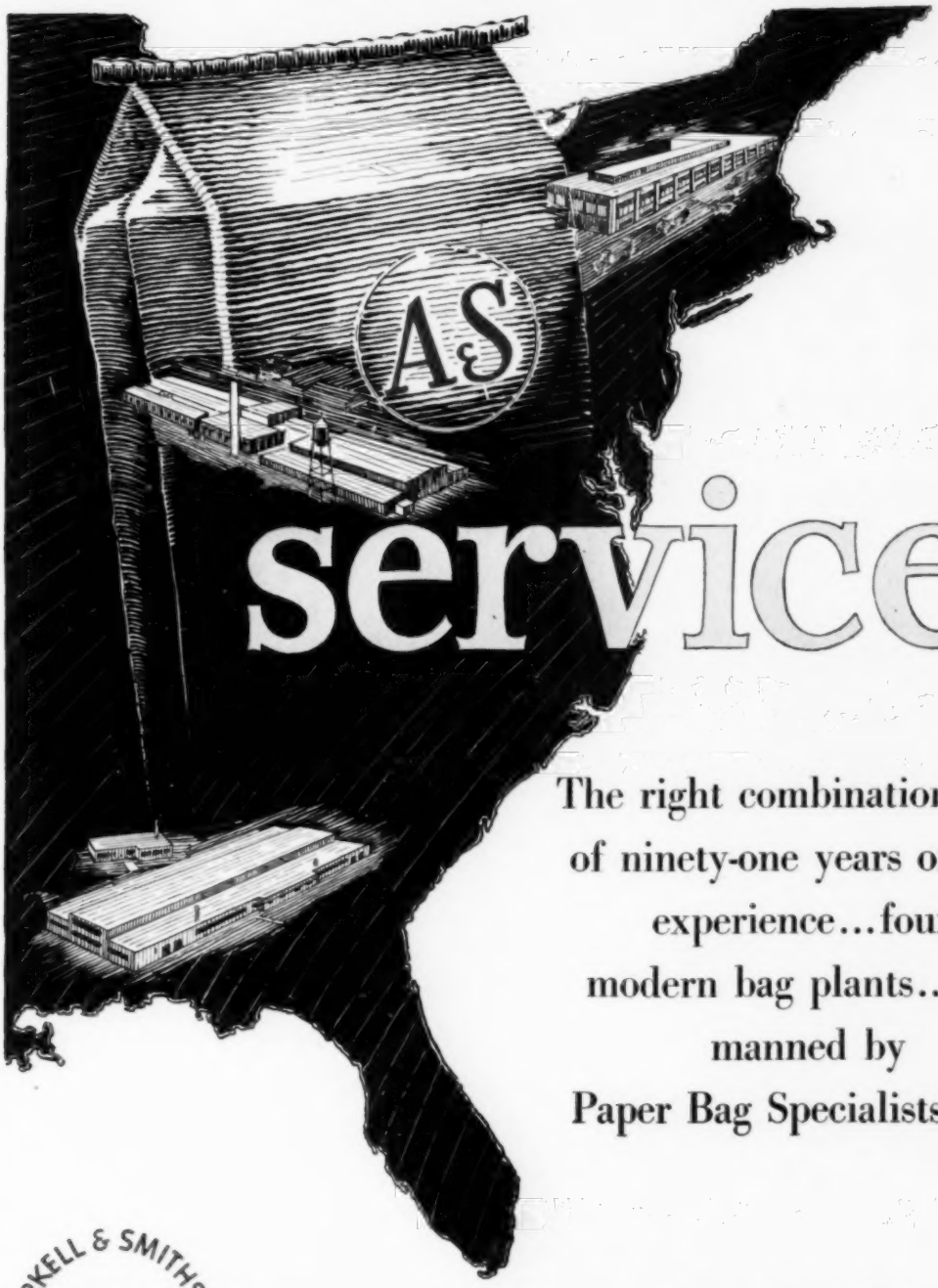
S/V SOVACIDE 544B– developed for airplane spraying – is lighter in color – now also suitable for high-pressure aerosol bombs.

Get full facts about these proved products from your S/V Process Products Representative.

SOCONY-VACUUM
Process Products

SOCONY-VACUUM OIL COMPANY, INC., 26 Broadway, New York 4, N. Y.
and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Process Products



service

The right combination of ninety-one years of experience... four modern bag plants... manned by Paper Bag Specialists.

ARKELL & SMITHS · THE OLDEST NAME IN PAPER BAGS ·

A&S

ARKELL and SMITHS

CANAJOHARIE, N. Y. • WELLSBURG, W. VA. • MOBILE, ALA.

Now! New Field Proof that

PITTSBURGH

PARATHION

LIQUID 25WM

controls a wider range of insects

Effective against major insect pests which attack

Apples	Peaches	Citrus	Melon	Cabbage
Apricots	Pears	Beans	Peas	Celery
Blueberries	Plums	Beets	Potatoes	Cucumbers
Cherries	Prunes	Carrots	Tomatoes	Tobacco
Grapes	Strawberries	Squash	Corn	Forage Crops

. . . and many others

RECENT field tests now show that Pittsburgh Liquid PARATHION 25WM (a "Pitt Chem" Product) effectively controls nearly *all* principal insect pests which attack the nation's fruit, vegetable and forage crops! This broader coverage makes possible the control of over 20 major insect pests—including aphids, greenbugs, leaf rollers, leaf hoppers, armyworms, European red mites, European corn borers and grasshoppers—through *one easy-to-use* insecticide. Liquid PARATHION 25WM, one of the most potent insecticidal chemicals known to science, forms an emulsion in water. It's easier to mix, easier to handle and easier to apply than Parathion in any other form. Pittsburgh PARATHION 25WM is packed in 1, 5, 30 and 55 gal. cans to meet all quantity needs.

Write Today for our Latest Recommendation for the use of Parathion 25 WM, or

Consult your Local "Pittsburgh" Representative

AGRICULTURAL CHEMICAL DIVISION

6505 Empire State Building, 350 Fifth Ave., New York, N. Y.

OTHER PITT CHEM AGRICULTURAL CHEMICALS

ORGANIC INSECTICIDES: Benzene Hexachloride, Toxaphene, Dichloro Diphenyl Trichloroethane, Aldrin, Dieldrin, Chlordane, Dinitro Ortho Cresol; ORGANIC PHOSPHATE INSECTICIDES: Parathion Wettable Powders, Parathion Liquid Concentrate, Metacide; WEED KILLERS: 2,4-D Acid, 2,4-D Amine Concentrates, 2,4-D Ester Formulated Concentrates, 2,4-D Sodium Salt Monohydrate; Rodenticides, Fungicides, Seed Disinfectants, Cotton Sprays and Dusts and other special Agricultural Chemicals.

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

The ALL-PURPOSE Unit

. . . For Producing

FIELD STRENGTH
HIGH CONCENTRATE
SULFUR BEARING

INSECTICIDE POWDERS

RAYMOND

WHIZZER EQUIPPED

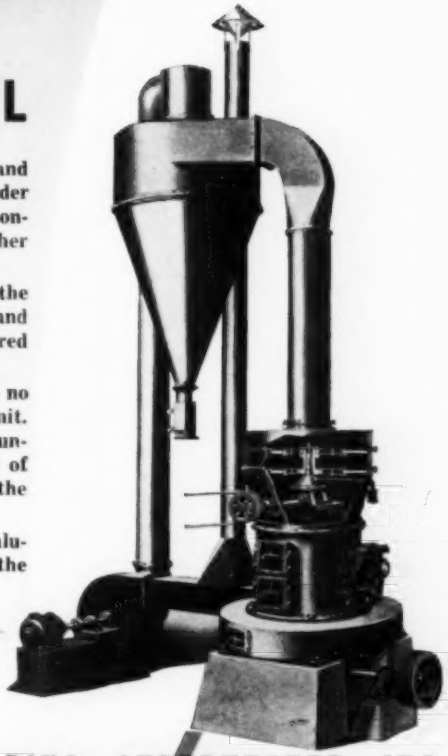
ROLLER MILL

Here is an up-to-date unit which will easily and economically handle all of your insecticide powder production, whether it be field strength, high concentrate, or sulfur bearing mixtures, and in either the medium or high fineness range.

The Roller Mill makes an intimate blend of all the newer insecticides with recommended fillers and produces the mixtures at practically any desired fineness to better than 99% passing 325 mesh.

Continuous twenty-four hour production—with no down time for cleaning—is assured with this unit. The Raymond Roller Mill is a slow-speed, cool running unit, and does not require artificial cooling of the material. Beside all these advantages, the system is dustless in operation.

One of these installations will doubtlessly be a valuable asset to your insecticide facilities in the critical years ahead.



Tell us about your operation and let us recommend the proper type and size Mill for your job.

Write for RAYMOND Catalog No. 61

COMBUSTION ENGINEERING - SUPERHEATER, INC.

Raymond
PULVERIZER DIVISION

Sales Offices in Principal Cities

1314 North Branch St.
Chicago 22, Illinois

IT'S LION FOR ONE STOP Nitrogen Service FOR FERTILIZER MANUFACTURERS

Lion Anhydrous Ammonia—Manufactured in Lion's modern plant to an 82.25% nitrogen content under accurate chemical control, the uniformity and high quality of this basic product are assured.

Lion Aqua Ammonia—This product is available to manufacturers for use in the formulation of mixed fertilizers or for sale as direct application material. Normally about 30% ammonia, its content can be controlled by order to suit your needs.

Lion Nitrogen Fertilizer Solutions—Made specifically for the manufacturing of mixed fertilizers, these products supply both ammonia nitrogen and nitrate nitrogen in the ratios desired. They are easily handled and available in three types designed for varying weather conditions, and for formula requirements in the production of fertilizers that cure rapidly, store well and drill evenly.

Lion Ammonium Nitrate Fertilizer—The improved spherical white pellets in this product contain a guaranteed minimum of 33.5% nitrogen. They flow freely, resist caking and store much better. Lion Ammonium Nitrate Fertilizer is shipped in 100-pound, 6-ply bags with two moisture-proof asphalt layers.

Lion Sulphate of Ammonia—This new, superior-type sulphate is guaranteed to contain a minimum of 21% nitrogen. Through special conditioning of the larger crystals, moisture and free acid content is greatly reduced. These factors, together with the special coating applied, make for greater resistance to caking in shipment or in storage. This product flows freely. It is shipped in bulk and in 100-pound, 6-ply bags laminated with asphalt.

LION

Technical advice and assistance to fertilizer manufacturers in solving their manufacturing problems is available for the asking.

"Serving Southern States"

LION OIL COMPANY CHEMICAL DIVISION EL DORADO, ARKANSAS

THE BAG THAT'S ALWAYS *ON GUARD*

Your product is never "A.W.O.L." when packed in a Fulton W.P.P.L. (waterproof paper lined) bag. The tough paper or plastic lining — laminated to Cotton or Burlap with strong adhesive — is not only sift proof, but is also an efficient barrier against moisture vapor.

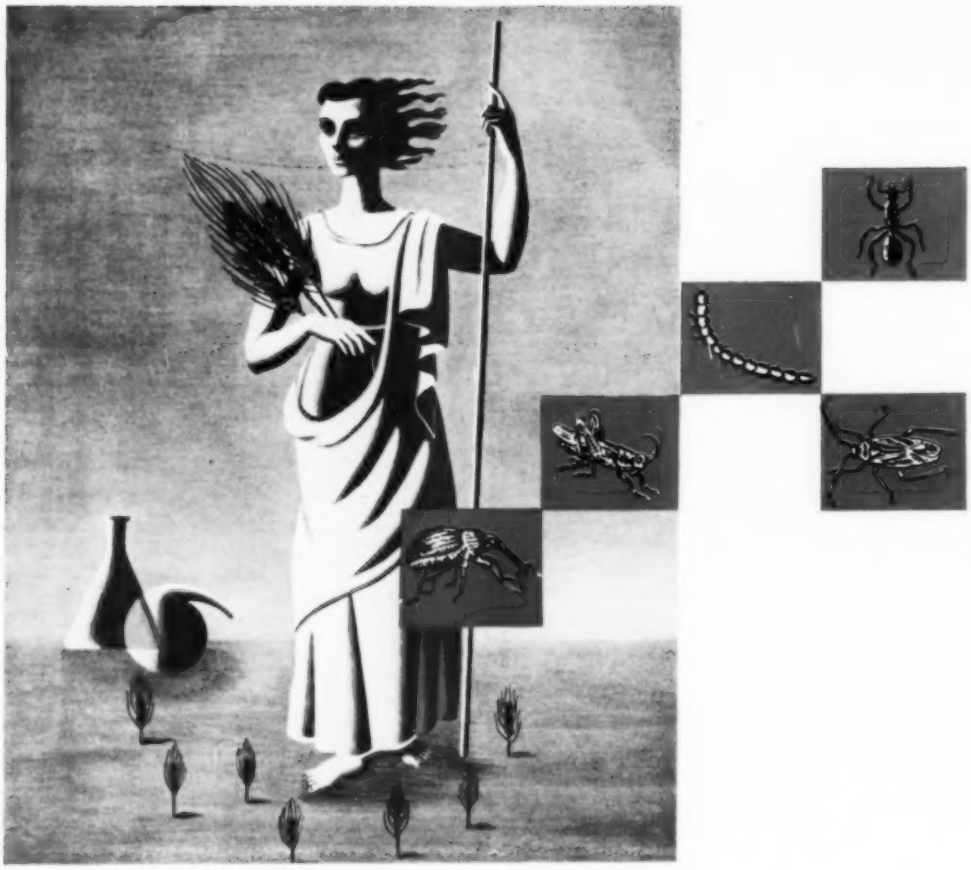
The chemical and fertilizer industry has found Fulton W.P.P.L. bags the ideal containers for sensitive products which require complete protection. For export or domestic shipments they have advantages over rigid containers because they are strong, flexible and easier to handle and requires less space for storage. There are important savings too in initial cost and freight.

Investigate the Fulton W.P.P.L. for your product. Saleswise, a packaging improvement is a product improvement. Address your nearest Fulton Branch for full information.

Our modern plant in New Orleans is turning out famous Fulton MULTIWALLS in larger and larger quantities. Complete satisfaction and highest praise from industry's largest users, have made Fulton Multiwalls more popular than ever before. Fulton makes the MULTIWALL Bag for your product—all types and sizes.

Fulton BAG & COTTON MILLS

Atlanta • St. Louis • Dallas • Kansas City, Kans. • Denver • Minneapolis • New Orleans • Los Angeles • New York City



Serving agriculture... ALDRIN *and* DIELDRIN

In Roman mythology Ceres was the goddess who presided over the fortunes of agriculture. Today we depend upon science, and especially upon chemistry, to help nature overcome some of the obstacles in the way of abundant growth and yield. ALDRIN and DIELDRIN are foremost among the chemicals which may be used to control destructive insects such as grasshoppers, boll weevils, fleahoppers, thrips, stink bugs, plant bugs and soil pests including wireworms, root borers, white grubs and ants.

ALDRIN and DIELDRIN, properly timed and applied, control a wide variety of insects with incredibly small dosages, in contrast to most other insecticides. Never before has it been possible to protect food, forage and fiber crops from their insect enemies effectively with such economical use of insecticides.

Comprehensive information regarding ALDRIN and DIELDRIN will be made available upon request to formulators or to those who work directly with insecticides containing these products in insect control programs. We invite correspondence.

Julius **HYMAN** *& Company*
DENVER, COLORADO

SHELL CHEMICAL CORPORATION *distributes unformulated* ALDRIN *and* DIELDRIN *in the United States.*

INDUSTRY NEWS

NAC Plans Big Florida Meeting April 4-6

A TIMELY program was being planned at press time for the National Agricultural Chemicals Association's first Florida meeting, to be held at Miami Beach, April 4, 5 & 6. Headquarters will be the Flamingo Hotel. Lea S. Hitchner, executive secretary of the NAC, indicated early this month that details of the meeting were being worked out satisfactorily, but that announcements of speakers and their subjects would not be made until nearer meeting time.

LEA S. HITCHNER

ERNEST HART

Ernest Hart, Niagara Chemical Division of Food Machinery Corp., Middleport, N.Y., president of the Association, will give his annual address at the meeting, and Mr. Hitchner will make his annual report to the group. Committee meetings and reports will also be on the agenda.

Efforts were being made in New York to arrange for a special train to Miami Beach for the convenience of those attending the Spring meeting. In charge of this activity was J. I. Shafer, B. G. Pratt & Co., New York. At press time it was reported that it would probably be necessary to abandon plans for the special train and that the convention party would travel in special cars on one of the regular trains.

A full program is expected to be ready for publication in the April issue of *Agricultural Chemicals*, and the meeting report will follow.

•

Plane Conference in Tenn.

How to use the airplane more efficiently in farming was the subject of a two-day study at the third annual National Agricultural Conference held at the Hotel Peabody, Memphis, Tenn., February 19-20.

Charley Rose, Roseland, Ark., is president of the National Flying Farmers Association, which sponsored the meeting. Cooperating with the Flying Farmers in the conference are the U. S. Department of Agriculture, land grant colleges, the Civil Aeronautics Administration, National Agricultural Chemicals Association, National Council, National Fertilizer Association, state aviation officials and boards of agriculture, the agricultural committee of the American Petroleum Institute, the Farm Equipment Institute, and the Memphis Chamber of Commerce.

The delegates went on record at the end of the meeting, protesting the present interpretation of the Wage and Hour Law which they declared will "put them out of business." The group pointed out that the law is impractical and that its application will impair the operation of custom operators and impair the progress of agriculture generally.

Featured on the program were talks by Russell Coleman, president of the National Fertilizer Association; Ernest Hart, president of the National Agricultural Chemicals Association; Dr. E. L. Haller, assistant chief, Bureau of Entomology and Plant Quarantine, USDA, Washington; L. M. Stahler, USDA, Brookings, S. D.; R. H. Beatty, American Chemical Paint Co., Ambler, Pa.; and Dr. K. Starr Chester, Battelle Memorial Institute, Columbus, Ohio.

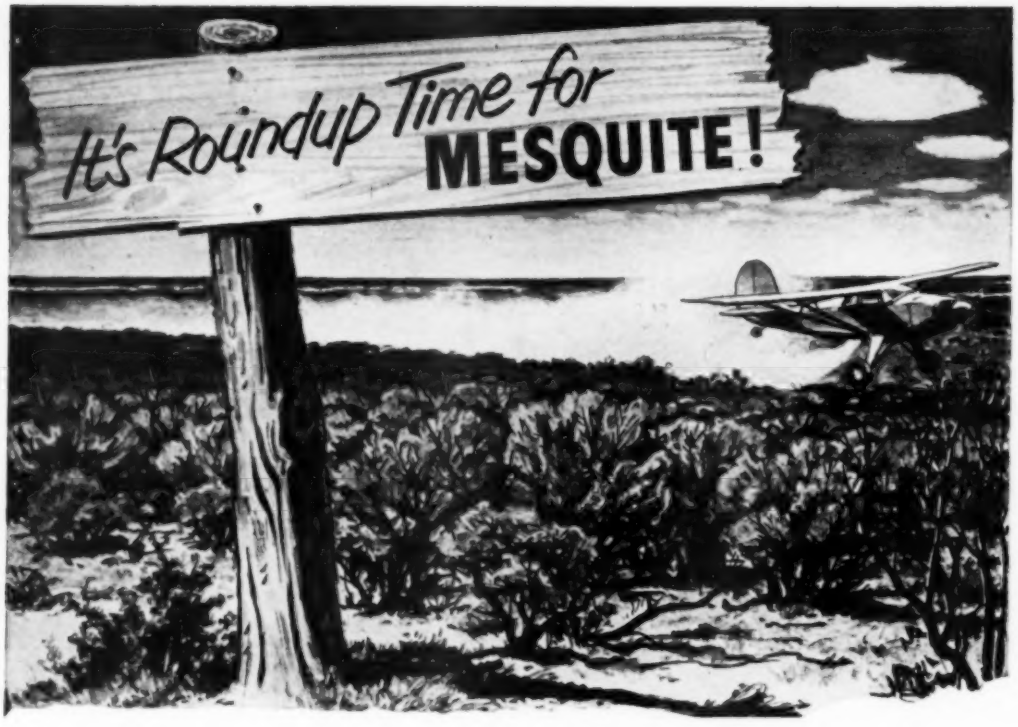
3 Day Aerial Ag. Conference at Columbus

THE third Ohio Agricultural Aviation Conference for aerial operators and others interested in use of airplanes in agriculture was held at Columbus, Ohio, February 12-14, 1951. It was sponsored chiefly by the Ohio State University and the Ohio Aviation Board with 8 other agencies cooperating.

The program covered three days, first of which was devoted to the control of plant pests by airplane. T. H. Parks, Extension Entomologist, Ohio State University served as chairman.

The second day was devoted to the use of the airplane in the fields of agronomy and soil conservation, with D. R. Dodd, extension agronomist, Ohio State University, serving as chairman.

The third day, held at the Ohio State University airport was devoted to engineering problems asso-



MESQUITE has spread itself over millions of acres of grassland in some of the drier sections of the United States.

It's a tough customer, too. Cut it off and it sprouts from the roots thicker than ever. Spray it with 2,4-D and it dies back a bit, then grows up again. And grubbing or bulldozing often costs more than the land is worth.

But now 2,4,5-T Brush Killers enter the picture, and the roundup for mesquite begins in earnest. In the growing season, airplane sprays of Du Pont 2,4,5-T Ester Brush Killer give fast, low-cost and lasting results on mesquite.

Du Pont 2,4,5-T also kills certain other tough brush and brambles that are resistant to 2,4-D. And it can be combined with Du Pont 2,4-D 46% Ester Weed Killer to destroy mixed brush growth.

Du Pont 2,4,5-T Brush Killers are more of the many outstanding farm chemicals developed by Du Pont to help farmers obtain better pest control.

DU PONT

REG. U.S. PAT. OFF.

DU PONT CHEMICALS FOR THE FARM INCLUDE:

Fungicides: PARZATE® (Liquid and Dry), FERMATE,® ZERLATE,® Copper-A (Fixed Copper), SULFORON® and SULFORON®-X Wettable Sulfurs . . . *Insecticides:* DEENATE® DDT, MARLATE® Methoxychlor, LEXONE® Benzene Hexachloride, KRENITE® Dinitro Spray, EPN 300 Insecticide, Calcium Arsenate, Lead Arsenate . . . *Weed and Brush Killers:* AMMATE,® 2,4-D, TCA and 2,4,5-T . . . *Also:* Du Pont Cotton Dusts, Du Pont Spreader Sticker, PARMONE® Fruit Drop Inhibitor, and many others. ® Reg. U.S. Pat. Off.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ciated with airplane usage in agriculture. R. D. Barden, Agricultural Engineer of the Ohio State University, served as chairman of this section.

Featured speakers were Frederick E. Weick, director, Personal Aircraft Research Center, College Station, Texas, who reported upon the airplane designed specifically for spraying or dusting, and now ready for testing for pest control.

Dr. K. Starr Chester, Battelle Memorial Institute, Columbus, Ohio, in charge of research work for the National Flying Farmers' Organization, reported on the "Progress, Status and Future Possibilities of Aerial Applications for Pest Control."

At the end of the conference the entomologists and plant pathologists prepared the following set of recommendations and evaluations of airplane usage applicable under Ohio conditions for the season of 1951.

ACCEPTED	EXPERIMENTAL AND WORTHY OF TRIAL	NOT RECOMMENDED
Legume Insects: (a) Spittlebugs (BHC or toxaphene) (b) Seed crop pests (DDT)	Clover: Root borer	Clover: Diseases
Field Crops: Grasshoppers (toxaphene or chlordane)	Corn: (sweet and seed) (a) Corn borer (b) Northern corn root-worm (c) Cutworms (d) Leaf aphid	Corn: (feed) (a) Chinch bug (b) Leaf blights (c) Stalk rots (d) Corn borer*
Potato: Beetles & leafhoppers (DDT)	Sugar Beets: (a) Aphids (b) Flea-beetles	Sugar Beets: Diseases
Tobacco: Hornworm (toxaphene)	Grain & Grass Crops: Armyworms	Fruit Trees: Insects & diseases
Peas & Turnips: Aphids (parathion)	Potato: Diseases Aphids	Forest Trees: Cicadas
Pine Trees: (a) European pine sawfly (DDT) (b) Hemlock looper (DDT)	Tomato: Insects & diseases	Fly Control: Poliomyelitis
Recreation & Camp Areas: Mosquitoes (DDT)	Muckland Crops: (a) Celery blight (b) Onion thrips	
	Lima beans: Leafhoppers	*Not recommended under the present level of borer population.
	Sweet Clover: Sweet clover weevil	
	Forest & Nursery Areas: (a) Locust leaf miner (b) Walnut Datana (c) Cankerworms (d) Japanese beetle (e) European pine shoot moth	
	Apple Trees: Stop-drop sprays	

Handles English Sales

Cooper McDougall & Robertson, Ltd., English manufacturer of insecticides, is now producing piperonyl butoxide under license of U. S. Industrial Chemicals, Inc., it has been revealed by the latter company. This material has been determined highly synergistic with natural pyrethrum and the combination has found a wide field of usefulness because of its effectiveness against insects and almost complete freedom from toxic hazards to men and animals.

Named Naco President

KENNETH D. MORRISON

Naco Fertilizer Co., subsidiary of W. R. Grace & Co., has named Kenneth D. Morrison president and director of the fertilizer Co. The firm plans to move its offices, now in New York, to Charleston, S. C. about April 1, in order to be nearer to its other offices, plants, stores and factories located in Florida, North and South Carolina and Ohio.

Mr. Morrison was formerly associated with Davison Chemical Corp., Baltimore, Md.

•

Science Committee Named

The pesticides committee of the 12th International Congress of Pure and Applied Chemistry has been announced. Dr. H. L. Haller, Bureau of Entomology and Plant Quarantine, USDA, Washington, is chairman; Dr. S. E. A. McCallan, Boyce Thompson Institute for Plant Research, Yonkers, N. Y., is vice chairman; and C. J. Kirster, E. I. duPont de Nemours & Co., Wilmington, Del., is secretary. Members-at-large include Drs. S. J. P. Chilton, Louisiana State University, Baton Rouge; C. W. Kearns, University of Illinois, Urbana; R. L. Metcalf, University of California, Riverside; and L. M. Stahler, South Dakota Agricultural Experiment Station, Brookings, S.D.

The Congress is scheduled to meet in New York, Sept. 10-13, 1951.

MEETINGS

South Dakota State Weed Conference. Corn Palace, Mitchell, S. D., March 14 & 15.

N. Central Branch, A.A.E.E., Commodore Perry Hotel, Toledo, Ohio, March 21 & 22.

Short Course on Use of Aerial Equipment in Agriculture, Purdue University, Lafayette, Ind., March 30 & 31.

Nat'l Agricultural Chemicals Assn., Flamingo Hotel, Miami Beach, Fla., April 4, 5 & 6, 1951.

American Chemical Society, 119th Meeting, Hotel Statler, Boston, Mass., April 1-5; Hotels Statler and Cleveland, Cleveland, Ohio, April 8-12.

National Materials Handling Exposition, International Amphitheatre, Chicago, April 30-May 4.

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 11-13.

American Plant Food Council, The Homestead, Hot Springs, Va., June 14-17.

12th International Congress of Pure and Applied Chemistry, New York City, September 10-13, 1951.

Combined meetings of American Association of Economic Entomologists; Entomological Society of America; American Phytopathological Society; and the Potato Association, Netherland Plaza Hotel, Cincinnati, Ohio, December 9-13.

convert
2,4-D
prospects
to customers
with this

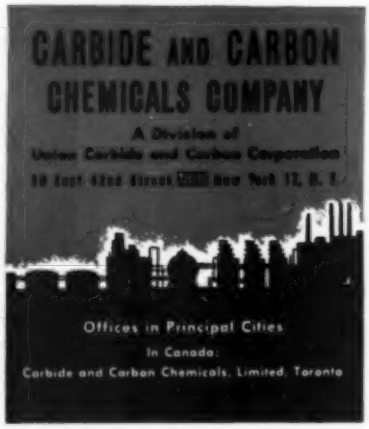
ISOPROPYL AMINE dry salt formulation

EASY TO MAKE — A tested formulation contains 73 per cent by weight 2,4-D, 23.4 per cent Isopropyl Amine, and 3.6 per cent citric acid. It is prepared by adding the anhydrous amine to a benzene slurry of the acids followed by filtration and drying. (If preferred, aqueous *concentrates* containing 4 pounds of 2,4-D per gallon can be made using Isopropyl Amine.)

EASY TO USE — The formulated dry salt is a free-flowing crystalline material that is completely stable in storage up to 150°F. It dissolves easily to a 3 per cent solution in water of hardness as high as 1,100 ppm. (as $CaCO_3$). No other additives are necessary and the formulation has the normal activity of amine salts of 2,4-D toward plant growth. Ordinary washing removes amine salt residues from spraying equipment needed for other service and spray nozzles remain clear.

LOW COST — Isopropyl Amine is economical for this use due to its low cost and low equivalent weight. The amine is shipped in anhydrous form, thus saving you the cost of storing and handling an aqueous solution.

ADDITIONAL INFORMATION — For additional information or a sample of Isopropyl Amine, call or write your nearest Carbide and Carbon Chemicals office.


CARBIDE AND CARBON CHEMICALS COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street New York 17, N. Y.
Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

V-C Announces Three Advancements

VIRGINIA-Carolina Chemical Corp., Richmond, Va., has announced the appointment of E. Y. Bass as assistant to vice-president in the general sales office of its Fertilizer Division. At the same time, the firm announced that John L. French, formerly sales manager at Shreveport, La., is being transferred to Richmond as assistant general sales manager of the Fertilizer Division. W. D. Barton, Jr., has been named to succeed Mr. French as manager of the Shreveport office.

W. D. BARTON, JR. E. Y. BASS J. L. FRENCH

Mr. Bass joined V-C's manufacturing department at Durham, N.C., in 1910. He was transferred to Richmond in 1913. A few years later, he joined the company's sales department and was appointed assistant general sales manager in November, 1949.

Mr. French, a native of Byhalia, Miss., first became associated with V-C in January, 1927, in the Memphis, Tenn., sales office. He served in various positions in that office, including assistant manager, and in August, 1946, was advanced to manager of the Shreveport office. At the time of his transfer to Richmond, he was serving as president of the Agricultural Council of Shreveport.

Mr. Barton began his career with V-C in 1944 as salesman in Texas. He was appointed assistant manager of the Shreveport office in June of last year. A native of Auburn, Ala., he is a graduate of Alabama Polytechnic Institute, where he was a member of Sigma Alpha Epsilon fraternity and the Blue Key Society, honorary leadership fraternity.

•

Potash Co. of Am. to D.C.

George E. Petitt, vice president and general sales manager of the Potash Company of America, has announced that on April 15th, the general sales office of the company will be located in Washington, D. C. Spacious quarters have been leased in the newly erected, air-conditioned Cafritz Building at 1625 Eye Street, Northwest.

The present offices at 50 Broadway, New York, which the company has occupied for approximately ten years, will be given up. John W. Hall, northern regional sales manager, and Paul C. Ausley, southern regional sales manager, will make their headquarters at the new Washington offices. Most of the New York office personnel will also be transferred.

•

Fertilizer Loan to Spain

A credit of $3,500,000 to Spain for the purchase of fertilizers, and $700,000 for equipment, machinery and parts necessary to complete a nitrogenous fertilizer plant has been advanced by the Export-Import Bank, it was announced February 13. This is part of the $12,200,000 over all credit extended to Spain.

The announcement stated that the fertilizer credit will assist Spain to revive her agricultural output and become less dependent upon foreign sources of supply for foodstuffs in which she has, in the past, been self-sufficient. The $700,000 credit for the fertilizer plant is in favor of the Sociedad Iberica del Nitrogeno, a private Spanish corporation founded in 1923 and one of the major producers of nitrogenous fertilizers in Spain.

Inquiries relating to the commodities and equipment eligible for financing under the credits should be addressed to the Spanish Embassy in Washington, D.C.

•

Kern Joins API Staff

Lowell A. Kern has joined the headquarters staff of the American Petroleum Institute, New York, to handle agricultural services. He came to the API from Swift & Company, Chicago, where he had been in charge of that company's agricultural information program. Kern will devote full time to the program planned by the API Committee on Agriculture and will be located at the Institute offices, 50 West 50th Street, New York City. He will be affiliated with the Department of Technical Services, under the direction of D. V. Stroop.

•

Opens New Plant In Texas

Wood Chemical Co. has just completed an insecticide and fertilizer blending plant in Lubbock, Texas, according to W. R. Wood, owner of the firm. The new plant is now operating, with a capacity to handle both liquid and dry materials. Annual plant capacity will be 10,000 tons of fertilizer and 7,500 tons of insecticide dust. Capacity of the liquid plant will be more than ample, Mr. Wood states.

Before building his own plant at Lubbock, Mr. Wood was associated with the Plant Food Corp., Los Angeles, Calif., as vice-president and director of sales.

Mesquite's

HONEY MESQUITE flourishing on rangeland (above) . . . mesquite after 2,4,5-T application (below).

Master...2,4,5-T

Honey mesquite, the thorny shrub that infests 75,000,000 acres of rangeland in the Southwest, has met its master in formulations of 2,4,5-T.

In experiments to exterminate mesquite in Texas, thousands of chemicals were tried in an effort to discover an effective weapon against it. Monsanto participated in these tests. After three years of testing 2,4,5-T formulations, authorities have recommended these materials as the only large-scale control agents acceptable from all standpoints.

2,4,5-T must be applied by experienced people using proper equipment. Employing it this way, 2,4,5-T can control mesquite for as much as 5 years or more at an economical cost.

Monsanto manufactures 2,4,5-T acid for preparing mesquite control formulation. Like many other herbicidal and insecticidal chemicals, 2,4,5-T is now in short supply. For further information on the use of 2,4,5-T or other Monsanto chemicals, contact the nearest Monsanto Sales Office or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS — PLASTICS

INSECTICIDAL CHEMICALS
ortho-DICHLOROBENZENE (Commercial Grade)
SANTO&ANE® (DDT)
SANTOCHLOR® (para-Dichlorobenzene)
SANTOPHEN® 20 (Pentachlorophenol, Tech.)
TRICHLOROBENZENE, Technical
NIFOS®-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only)
NIRAN® (Parathion. For agricultural use only)

HERBICIDAL CHEMICALS
2,4-D ACID 2,4-D SODIUM SALT
2,4-D ISOPROPYL ESTER 2,4,5-T ACID
2,4,5-T ISOPROPYL ESTER
SANTOBRITE® (Sodium Pentachlorophenate, Tech.)
SANTOPHEN 20 (Pentachlorophenol, Tech.)

*Reg. U. S. Pat. Off.

SERVING INDUSTRY...WHICH SERVES MANKIND

Agricultural Sulphur Needs Slighted,— House Agriculture Committee Charges

TAKING cognizance of inadequate attention to the needs of agriculture in the allocation of scarce and critical materials, and particularly of the immediate need of agriculture for a more adequate allocation of the short supplies of sulfur and sulfuric acid, the House Committee on Agriculture late last month approved a strongly worded report on the subject submitted by its Special Subcommittee on Fertilizer and Farm Machinery.

Following the Fertilizer and Sulfur Hearings, held in Washington, Feb. 20-23, the subcommittee issued its report which painted an extremely serious picture: demand (including export needs) will exceed supply by more than 500,000 tons this year,—yet there is little immediate prospect of appreciable increases in the inadequate supply.

In the face of American agriculture's immediate need for more fertilizer, the Committee noted, "sulfur and sulfuric acid are being allocated and distributed without any policy determination as to the essential nature of agricultural production and the necessity of fertilizer to that production." The Committee also pointed out that "the present system of establishing priorities for scarce materials by 'DO' ratings and orders completely disregards the requirements of agriculture and may very quickly create a situation where the availability of materials for agricultural purposes will be reduced to zero. No agency representing agriculture is authorized to issue these 'DO' ratings whereas numerous other procurement agencies are authorized to do so—even for such items as office equipment and furniture."

The Committee's report cites further, as an indication of the manner in which the requirements of agriculture are being disregarded, that "the Department of Agriculture has not been consulted in the drafting of an allocation order for sulfur and other chemicals which it was stated will soon be issued."

To aid in stretching present supplies, the Committee recommends that substantial quantities of sulfuric acid now being wasted or discarded after its use in various industrial processes be reclaimed for use in fertilizer production. "More effective use of the phosphate fertilizers which are available to agriculture might be obtained," the Committee also believes, "by a review by the appropriate Federal and State authorities of mixed fertilizer formulas with the objective of reducing the phosphate application to those crops which can get along temporarily on smaller amounts of this plant food, so that the available material may be utilized for those crops where increased production is directly dependent on phosphate application."

The Committee took a strong stand on the export of materials which are so critically needed at home in its general recommendations, which follow.

1. That those in charge of the defense program recognize and act upon the elementary fact that agriculture is an essential defense industry and should be given that status in any allocation of critical materials.
2. That advisers and consultants under the supervision and direction of the Secretary of Agriculture qualified and authorized to present the requirements of agriculture, be appointed to participate with the policy-making officials at the highest levels of defense program administrations, agencies and authorities.
3. That the export program be critically reviewed with the objective of finding out how much American sulfur the industries of other countries can do without—not how much they would like to have.
4. That the present users of sulfur and sulfuric acid be carefully surveyed to discover how much of this material now being wasted or discarded can be recaptured or reused and that positive steps be taken to see to it that this material is saved and utilized.
5. That all possible long-range sources of sulfur and sulfuric acid be examined and analyzed by competent and appropriate governmental agencies—and that sulfur recovery, production, or reconstitution facilities be required, where appropriate, as a condition of the approval of any facility for accelerated amortization or any other such governmental assistance.
6. That research be intensified to discover whether there is a practical and economic method of producing phosphate fertilizer without sulfuric acid or with proportionately reduced quantities of that material.

Agr. Air Conference Held

The U.S.D.A. and the Civil Aeronautics Administration jointly sponsored an Agricultural Aircraft Conference in South Agriculture Building, Washington, D. C., Feb. 27 and 28 and March 1. One panel considered aircraft pest control subjects of general interest, such as: Advantages and limitations of aircraft in pest control; planning control operations; contract requirements; operational problems, and the use of aircraft by the Forest Service.

Another panel considered pest control materials, their production, labeling, use and effectiveness, tolerances, hazards, protective equipment, etc. Problems relating to the uniform application of sprays and appraisal of deposits were also discussed.

A special panel on equipment reviewed the various types of equipment in use, considered relative merits and also dealt with research in the development of new equipment. Two moving pictures illustrating aerial dusting operations were shown. We hope to present a more detailed account on the conference in our April issue. Participants for the U.S.D.A. included Avery Hoyt, Chief B.E.P.Q. and Messrs. Bishopp, Haller, Sheals, Messenger and others.

•

Fertilizer Barge Sunk

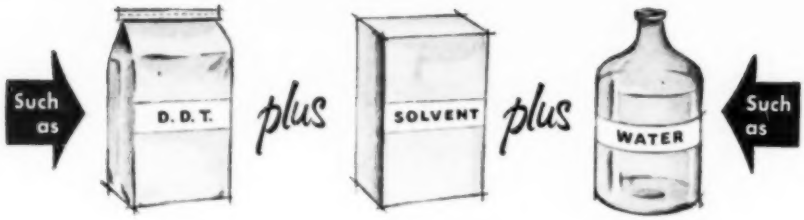
The *Delmarva*, a 75 foot power boat, owned by the Valiant Fertilizer Co. of Centreville, Md., and loaded with 150 tons of fertilizer, was sunk in Chesapeake Bay, March 2nd, when struck by a bay ferry. Her crew of three men had time to jump from their boat to the ferry.

•

Canadian Weed Brochure

"Steps Toward Effective Weed Control" is the name of a 16-page booklet issued recently by the Manitaba (Canada) Department of Agriculture and Immigration, Winnipeg.

MANY UNMIXABLES
do mix



. . . . with the help of an
ANTARA®
SURFACTANT

Many "unmixable" combinations are readily combined—to form stable and uniform fluids, lotions, creams or sprays — with the help of a **SURF**ace **ACT**ive **AGENT**. The new, or improved products, act more quickly — more thoroughly — or for a longer period of time. They are thus easier to sell; they frequently cost less to make.

Some thirty industries — including the agricultural, insecticide, rubber, petroleum and textile fields—have profitable uses for Antara surfactants.

Extensive research staffs and facilities support the development and application of Antara surfactants—available to help you improve an existing product or develop a new one. Your inquiry is invited — without obligation. It will bring a prompt opinion as to whether one of the Antara surfactants may be adaptable to your needs. Kindly address your inquiry to Department 44.

....One new business card now bears two familiar names

ANTARA® PRODUCTS
DIVISION OF
GENERAL DYESTUFF CORPORATION
435 HUDSON STREET • NEW YORK 14, NEW YORK

BRANCHES
Boston • Providence • Philadelphia • Charlotte, N. C. • Chicago • Portland, Ore. • San Francisco
IN CANADA: Chemical Developments of Canada Limited, Leaside, Toronto 17

Washington News Letter

THE House agreed on February 20th to provide $35,000 additional to the Delaney Select Committee to continue its investigation of the use of chemicals in food products. This will mean a resumption of the hearings that have already been under way for several months.

* * *

Dr. M. A. McCall, who is an Assistant Chief of the Bureau of Plant Industry, has been appointed temporarily to take over the duties of the late Dr. S. A. Rohwer, as assistant to the administrator of the Agricultural Research Administration. Dr. H. L. Haller, newly appointed Assistant Chief (Insecticide, Chemistry) of the B.E.P.Q., (Page 85) will take over other of Dr. Rohwer's duties, including patents and aerosol licensing. Dr. Rohwer's responsibilities in connection with regulatory activities in the Bureau are as yet unassigned.

* * *

Cotton pesticide manufacturers, as well as cotton growers, were happy to note the recent heavy rains which drenched the drought-stricken area of south Texas, particularly in the Rio Grande Valley. This precipitation opened the way for initial seeding of the new cotton crop, but despite downpours of as much as two inches in a single day, the drought is not over even yet, USDA officials declared. This may affect the achievement of a 16 million bale harvest hoped for in 1951. It is toward this goal that the cotton insecticide and fertilizer industries have geared much of their production plans for the year, and the factor of weather may be an important one.

The difficulty with regard to price control stagnation has also had some effect on the desire on the part of growers to put in the large acreage of cotton that is needed. Cost of production has mounted sharply, involving a greater risk of capital than the average field crop. Some growers, particularly in the southeast, fear the possibilities of a price collapse that would have a lasting effect on general economic conditions in their area, and therefore, do not desire to undertake heavy seeding at this time. Another difficulty is the growing scarcity of labor, shortage of seeds following the unusually small crop of 1950, and good prices for other crops which may affect the actual acreage of cotton put in. Yet U.S.D.A. officials already report they are being swamped with requests for assistance in getting insecticide supplies.

* * *

N.P.A. has set up two industry committees on agricultural pesticides, namely, the overall Agricultural Pesticide Industry Committee and the DDT Industry Advisory Committee. The DDT group met and recommended that 25% of production be set aside for the fulfillment of DO orders. This decision has already been implemented as an amendment to Order M-32 which is expected to be the overall chemical order. Incidentally the DDT Committee will meet again in mid March. A suggested downward revision of the 25% set-aside is scheduled for discussion.

The pesticide group had its original meeting and as a result, three task groups have already been set up and more are contemplated. BHC, 2,4-D and 2,4,5-T, and the arsenical producers have already had initial meetings. The BHC group concluded that until additional quantities of chlorine and benzene are made available, there can be no great increase in the production of technical BHC. However, production to date since the start of the Korean emergency period has been at a greatly expanded figure in spite of the benzene and chlorine shortages.

The 2,4-D and 2,4,5-T group also discussed problems resulting from the benzene and chlorine shortages. It is apparent that unless something is done at once to improve the production of these items appreciably, they will both continue in short supply during the coming season.

The arsenical producers group, on the other hand, have indicated that production plans will face no great problem from the point of view of raw material shortages. White arsenic may be somewhat of a problem, but it is not contemplated to be serious. Containers for arsenicals as well as for other pesticidal chemicals will be a real bottleneck during the coming season.

* * *

A special sub-committee of the House Committee on Agriculture has been set up to investigate the supplies of fertilizers and farm machinery for the coming year. The inquiry has been extended to include pesticides.

Representative Thomas G. Abernethy is chairman of this group, and several discussions have been held to date at which the problems of these three groups have been thoroughly investigated. The work to date of the sub-committee as far as fertilizers are concerned, has really revolved about a very detailed study of the current shortage of sulfur. The main spokesman for the Department of Agriculture has been Frank K. Woolley, Deputy Administrator, Production & Marketing Administration. In his appearance before the sub-committee, he stressed that the available supplies of plant nutrients this season will exceed those of 1949-50 by approximately 250,000 tons, but will fall short of the estimated minimum needs of agriculture by about 500,000 tons. Fertilizer supplies for 1950-51 season will be 4,471,000 tons, he indicated, against estimated minimum needs for the year of 5,000,000 tons. The amount used in 1949-50 was 4,215,000 tons.

It certainly is apparent from these hearings that sulfur allocation and possibly sulfuric acid allocation are just around the corner. As far as sulfur is concerned, Mr. Woolley estimated that the 1951 sulfur requirements of agriculture are as follows: 1,350,000 tons for superphosphates, an increase of 24% over 1950; 420,000 tons of ammonium sulfate, an increase of 2.7%; and 219,000 tons for other agricultural uses, an increase of 5%. (See Page 81 for the committee's recommendations on what should be done about the sulfur shortage).

Best advice I ever had—

Don't Use Parathion Unless You Use a WILLSON

AGRISOL RESPIRATOR

Parathion is much too dangerous to handle without proper safeguards — most of all against inhaling and swallowing it.

The AGRISOL Respirator provides ample protection against the dust, mist and vapor created when mixing and spraying Parathion. It was tested by the U. S. D. A. and found to give a high degree of protection. You can recommend the AGRISOL Respirator with confidence in its effectiveness against Parathion and other toxic insecticides.

Send for these two bulletins:

1. Complete information on design features; hazards in using Parathion; and trade names of insecticides.
2. Care and maintenance to keep respirator in good condition for highest efficiency.

WILLSON®

Dependable Products Since 1870

WILLSON PRODUCTS, INC.

116 Thorn St., Reading, Penna. U. S. A.

Repercussions may also be expected in the Senate. Several influential Senators have requested details so they can check on what attention is being paid to the needs of agriculture for scarce materials.

* * *

The TVA is currently making much of the fact that price of its ammonium nitrate fertilizer has been held to the January 1949 price level, which is substantially below the present market quotations of commercial producers. The latter are quick to point out that TVA's prices have never necessarily had any direct relation to cost factors. TVA, they have often pointed out in the past, is supported by the taxpayers rather than itself paying taxes. Also, TVA, unlike private business, does not need to make profits to continue operating.

* * *

The Victory Garden or the home garden of World War II is coming back again, but under a new name. The Department of Agriculture has gotten behind a move to expand home gardening which was sanctioned by Secretary of Agriculture Brannan. Secretary Brannan did not approve the program because of fear that the famers were not going to be able to produce enough food this year to meet demand, but rather according to the statement of the Department, "as a means of improving the diets and health of the people and thereby strengthening the defenses of the country." The farmers will benefit in the long run, it was pointed out, because families that take up gardening seem to develop a taste for vegetables and fruit which has a permanent effect on their consumption habits.

However, "this back-to-the-home-garden" movement will mean increases in the amounts of fertilizers and pesticides that will have to be made available in the smaller size packages used by the home gardener.

* * *

Letters are reported in the mail (March 1) advising members of the Fertilizer Industry Advisory Committee of their appointment, and inviting them to attend a first organization meeting on March 9. The personnel of the committee has not as yet been officially announced, but it is reported to number about thirty.

Dr. H. L. Haller Named Asst. Chief B.E.P.Q.

Dr. H. L. Haller, U. S. Department of Agriculture, was appointed Assistant Chief of the Bureau of Entomology and Plant Quarantine

DR. H. L. HALLER

in charge of insecticides and chemical problems relating to insect pest control, March 1, it was announced by Avery S. Hoyt, Chief of the Bureau. Dr. Haller has been special assistant to the Chief of the Bureau since 1947. He was assistant leader of the Bureau's Division of Insecticide Investigations from 1937 to 1947.

A graduate of the University of Cincinnati and of Columbia University, Dr. Haller entered the U. S. Department of Agriculture in 1919 following service in the first World War. In 1923 he was appointed to the staff of the Rockefeller Institute for Medical Research as an associate in chemistry. He returned to the Department of Agriculture in 1929 to work on insecticides.

One of Dr. Haller's outstanding contributions to science—made in collaboration with Dr. F. B. LaForge and L. E. Smith—was the determination of the chemical structure of rotenone. The Chemical Society of Washington awarded its Hillebrand prize for 1932 to Dr. Haller and Dr. LaForge for this achievement. During World War II Dr. Haller directed and coordinated experimental work on DDT, other insecticides, and repellents. Both the Army and the Navy cited him for these contributions. He also served as a technical adviser to the office of Scientific Research and Development.

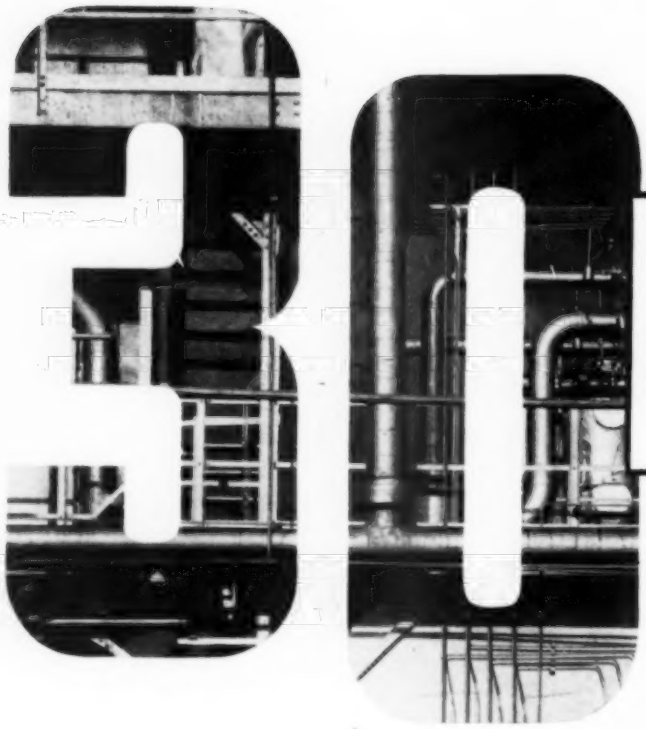
Dr. Haller's new assignment covers the various chemical aspects of the Bureau's activities including the development, manufacture, and use of attractants, repellents, insecticides and accessory materials. He will act as liaison officer between the Bureau, and manufacturers of insecticidal chemicals, as well as formulators of insecticides.

Plans are reported under consideration for establishment of an insecticide manufacturing plant at the Oklahoma State Prison. A recent NACA bulletin gives details of the proposal. Insecticide manufacturers are entering protests.

* * *

Below are listed the requirements of the principal pesticides for the 1951 crop year as given to the hearing on fertilizer and pesticide supplies before the Special Fertilizer & Farm Machinery Sub-Committee of the House Committee on Agriculture, February 20, 1951, by Frank K. Woolley, Deputy Administrator, Production & Marketing Administration:

DDT	58,000,000	lbs.
Benzene hexachloride (12% gamma basis)	65,000,000	"
Toxaphene	45,000,000	"
Aldrin	2,800,000	"
Chlordane	3,000,000	"
Parathion	7,350,000	"
Orthodichlorobenzene & paradichlorobenzene	4,500,000	"
Pentachlorophenol	2,500,000	"
Carbon tetrachloride	3,500,000	gal.
2,4-D and 2,4,5-T weedkillers (acid equivalent basis)	22,000,000	lbs.
Lead arsenate	37,000,000	"
Calcium arsenate	52,000,000	"
Copper chemicals	112,000,000	"
Elemental sulfur	180,000	tons
Dithiocarbamate fungicides	10,000,000	lbs.
Diphenylamine	2,350,000	"
Pyrethrum	5,000,000	"
Rotenone	10,000,000	"
Nicotine	1,000,000	"
Cryolite	2,500,000	"
Mercurials, as metallic mercury	360,000	"
Lime	150,000	tons
Talc, pyrophyllite, and similar diluents	75,000	"



30 YEARS' EXPERIENCE YOU CAN USE

MATHIESON CHEMICAL CORPORATION, Pasadena, Texas, is using a Monsanto-designed contact sulfuric acid plant, rated at 400 tons daily. It has operated efficiently at more than 500 tons daily. The photo shows portions of the combustion chamber and connecting pipe.

Whether you are planning to start producing your own sulfuric acid or thinking of expanding your present plant, you can use Monsanto's 30 years' experience. Why not consult Monsanto? See what you can gain from Monsanto's three decades of experience in designing, building and operating contact sulfuric acid plants.

Monsanto-designed plants, with their many exclusive features, give you the following important advantages:

1. **CAPACITY** to meet your needs . . . ranging from five to five hundred tons of acid (100% H_2SO_4 basis) daily, with no equipment in parallel.

2. **FLEXIBILITY** in operation from 30% of capacity to more than rated capacity without "blanking off" or other operations that consume time and labor.

3. **EFFICIENCY and ECONOMY.** Monsanto-designed plants deliver top efficiency with low costs of operation and maintenance. They produce by-product steam that means further savings.

More than 250 Monsanto-designed sulfuric acid plants are serving industry throughout the world. Many of them have paid for themselves in savings. In addition, their owners have gained control of their supply of vital sulfuric acid.

At your request, and without obligating you or your company, a Monsanto representative will call on you with complete information. Write, telephone or wire MONSANTO CHEMICAL COMPANY, Engineering Sales Department, 1700 South Second Street, St. Louis 4, Missouri.

MONSANTO VANADIUM CATALYST, used in producing more than 40% of the world's sulfuric acid by the contact method, is employed in more than 250 plants in 28 countries. Monsanto's vanadium catalyst is highly efficient, rugged, long-lasting. Write for technical information.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

S. W. Branch, AAEE Holds First Meeting

THE first annual meeting of the Southwestern Branch of the American Association of Economic Entomologists was scheduled to be held at the Adolphus Hotel, Dallas, Texas, March 1 and 2, with a program of technical papers, discussions, banquet and election of officers. Dr. Roy E. Campbell, Alhambra, Calif., president of the A.A.E.E., was to address the group on Thursday morning, and H. G. Johnston, College Station, Texas, chairman of the SW Branch, was to present an address "Trends in Insect Control," also on Thursday morning.

Technical papers announced on the advance program numbered 35 in all, including a number on control of insects infesting cotton; screwworm control; a study of toxicity of organic insecticides to honeybees; and a paper, "Hazards Involved in the Production and Use of Agricultural Pesticides" by Dr. Frank Princi, University of Cincinnati, Cincinnati, Ohio.

Officers of the Southwestern Branch, in addition to chairman Johnston, are: D. E. Howell, Stillwater, Oklahoma, vice-chairman; and Sherman W. Clark, Texas Gulf Sulphur Co., Houston, Texas, secretary-treasurer. The committee for arranging the meeting was composed of P. J. Reno, chairman; A. C. Gunter, C. A. King, and J. M. Landrum.

Refreshments furnished by members of the pesticide industry, were to be served during recess periods at the meeting, according to the advance announcements.

Ball Heads Weed Control Association

WALTER S. Ball, Sacremento, Calif., Chief, California Bureau of Rodent and Weed Control, was elected president of the Association of Weed Control Conferences at the second annual meeting of the group in Memphis, Tenn., February 9. The association met during the Southern Weed Conference.

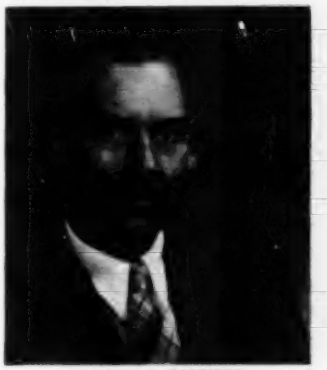
Dr. W. W. Worzella, Brookings, S.D., head of the department of agronomy, South Dakota Agricultural Experiment Station, was chosen vice president. Dr. Roy L. Lovvern, Beltsville, Md., head of the division of weed investigations, Bureau of Plant Industry, Soils and Agricultural Engineering, USDA, was elected secretary.

Making up the Association of Weed Control Conferences are representatives of the Northeasten, North Central, Southern, and Western Weed Conferences. The organization was formed to consider weed control problems of national scope, to serve as a clearing house for work of the member groups, and to stimulate greater interest in weed control activity.

Left to right around the table are: Dr. O. E. Sell, agronomist, Georgia Agricultural Experiment Station, representing Southern Weed Control Conference; Dr. G. M. Shear, physiologist, Virginia Agricultural Experiment Station, Southern Weed Conference; Dr. R. L. Lovvorn, head, division of weed control investigations, Bureau of Plant Industry, Soils and Agricultural Engineering, USDA, Beltsville, Md.; Dr. Ball; Dr. R. D. Sweet, Horticulturist, New York Agricultural Experiment Station, Ithaca, Northeast Weed Control Conference; and Dr. S. N. Raleigh, agronomist, Pennsylvania State College, Northeast Weed Control Conference.

•

Denning Joins Velsicol



DONALD G. DENNING

Velsicol Corporation, Chicago, has announced that Dr. Donald G. Denning has joined the firm as entomologist, to be located in the Rocky Mountain region. Dr. Denning will work with the Federal and State Experiment Stations as well as Dominion entomological laboratories. The new appointee is a graduate of Macalester College and the University of Minnesota and has been associated with the University of Wyoming Experiment Station and College of Agriculture as entomologist for the past four years.

During World War II, he served in the Commission corps of the U. S. Public Health Service.

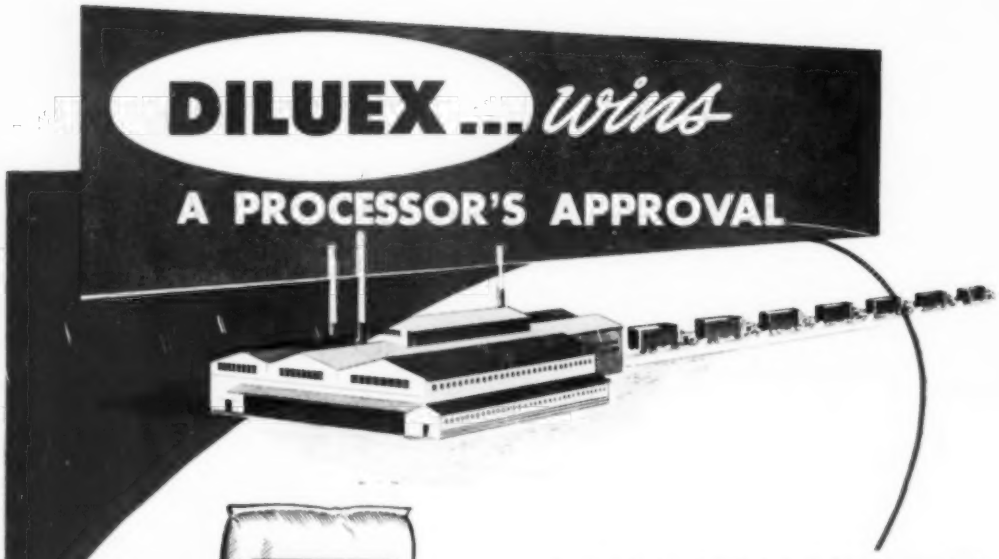
•

Offers Mixer Literature

Descriptive literature covering its line of wet and dry mixers, mixing kettles, rotary dryers and flakers has been issued recently by the Cleveland Mixer Co., engineers and manufacturers. The four-page folder presents illustrations of the equipment also. Copies are available from Cleveland Mixer Co., 7016 Euclid Ave., Cleveland 3, Ohio.

DILUEX ... *wins*

A PROCESSOR'S APPROVAL



On the basis of technical study and practical experience, Floridin products, extracted and specially processed at Quincy and Jamieson, Florida, are coming into more and more general use in the agricultural chemical industry. Here are the steps in a typical case:

1. Laboratory formulations, and comparisons with alternative materials.
2. Laboratory report.
3. Plant tests, for volume and quality output.
4. Approval of plant management.
5. Increased production and sales volume.
6. Continuing increases of tonnage to meet growing demand.

Are you impregnating toxaphene—chlordane—aldrin—parathion—any liquid toxicant?

Are you milling DDT, BHC, or other organics?

Formulating blended dusts?

For any of these processes, it will be worth your while to learn about DILUEX and DILUEX-A. Your request for samples and additional data will receive prompt attention.

FLORIDIN COMPANY

Dept. M, 220 Liberty St., Warren, Pa.

Soil Improvement Meeting

By H. H. SLAWSON

GRASSLAND farming and its possibilities for developing "off season" distribution of fertilizer held the spotlight at the annual meeting of the Midwest Soil Improvement Committee in Chicago, Feb. 16.

Gathered at the Palmer House with the manufacturers who sponsor the committee, were college agronomists and soil scientists, with progress reports on the use of fertilizers for development of pastures and meadows.

Of outstanding importance was the presentation by Dr. D. R. Dodd, Ohio State University, Columbus, of facts and conclusions from his extensive survey of pasture practices in the corn belt and elsewhere. Five other scientists also told of specific conditions in twelve states. Speaking for Minnesota, Iowa, and Wisconsin was Prof. Paul Burson of the Univ. of Minnesota. Kansas, Nebraska, North and South Dakota were covered by Prof. Kling Anderson of Kansas State College; Kentucky and Missouri by Prof. E. N. Fergus, Univ. of Kentucky; Indiana and Illinois by Dr. G. O. Mott, of Purdue; and Michigan and Ohio by Dr. D. L. Cook, of Michigan State College.

Returning only a month previous from his survey involving 16,000 miles of travel in 31 states, Dr. Dodd told in considerable detail his observations of the type and extent of grassland research at the various experiment stations; the nature of techniques and extent of extension service grassland programs; and the extent to which farmers are utilizing and profiting from such information. Most of his studies were made in middle western states, but for comparison, they also extended into the east.

In general, Dr. Dodd found that farmers have made some effort to establish good sods in their cropping programs, but have done very little to maintain them. Until very recently, he said, not much has been done to improve permanent or continuous sod land, although, as he asserted, there is no area on the farm where there is opportunity to do more or from which greater gain can be obtained.

All over the U. S., Dr. Dodd said, experiment stations and extension services have been putting increased emphasis on grassland crops.

Widespread Program

COUPLED with the recent additional emphasis placed on grassland programs by the land grant colleges and U.S.D.A., he found that business and civic organizations are joining to contribute to the program. This emphasis, he declared, is necessary to conserve and improve soil productivity and guarantee adequate supplies for the future.

Dr. Dodd said he found everywhere campaigns and contests under way to stimulate grassland farming. Fertilizer companies and other organizations are planning still more action, he reported.

The grassland idea, he continued, has taken hold more rapidly in the south and east than in the middle west. Among reasons for this in the south he cited reduction of cotton and other row crops and the proportional increase in livestock; the low returns from cotton; the extensive soil depletion and the discovery that relatively much better income could be obtained from grassland livestock.

Discussing problems affecting further progress, Dr. Dodd said there are not enough grassland specialists. Experiment stations lack funds to undertake needed work and the extension service lacks the manpower needed to organize and direct the educational activities and programs being called for. Work is acutely needed at the farm and community level, he pointed out, to determine how findings may be applied.

"I am inclined to believe," he declared, "that, on the average in the middle west, farming is still definitely of the soil productivity exploitation type".

Taking up the matter of use of nitrogen, phosphoric acid and potash on sod land, Dr. Dodd said, there is still much uncertainty on when, where and how to use them indicating the need for much more extensive trials. "Possibly we do not know as much as we should," he added, "in order to advise farmers wisely. There does, seem to be a rather unanimous opinion that much more general, frequent and liberal application should be used on sod lands east of the range area, he declared.

"It appears also that there are considerable periods within the year when farmers might use fertilizers on sod land to advantage, when they do not have them on hand. Possibly a broader period of distribution can be worked out".

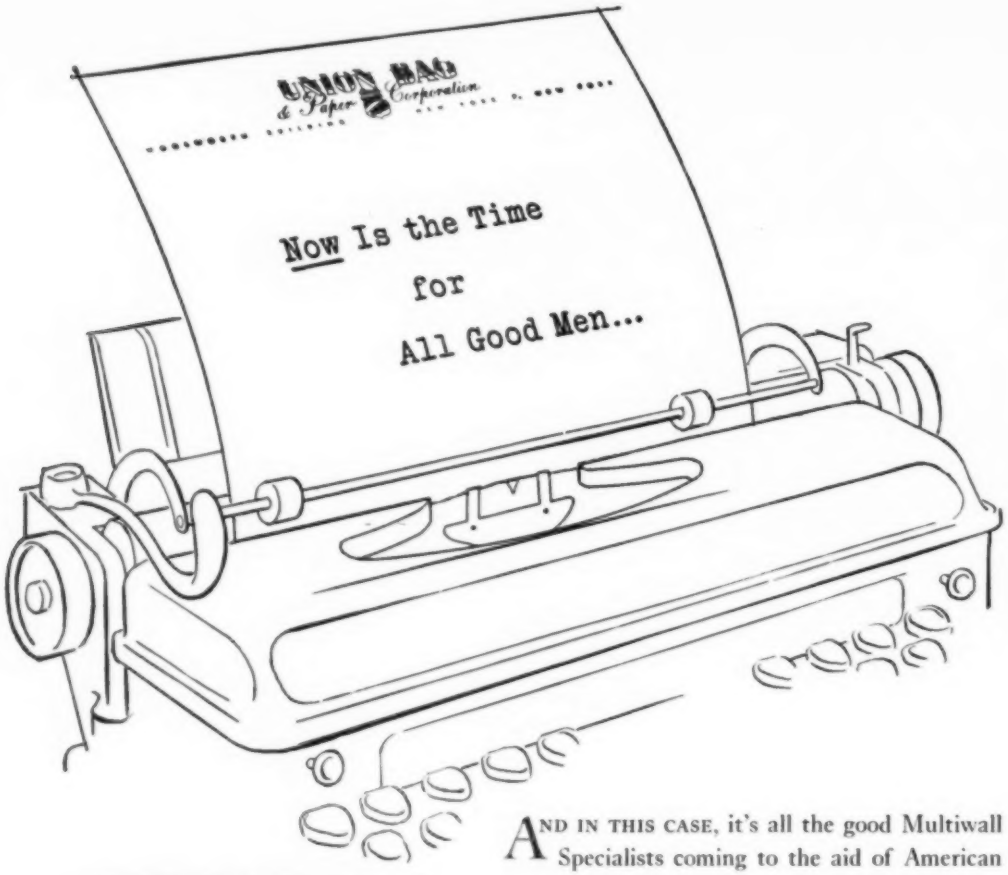
Concluding, Dr. Dodd commented that sufficient contact is lacking between research, extension and other grassland workers in the same and adjoining states. This situation, he suggested could be improved by more intra- and inter-state conferences; by appointment of some general representative who would keep posted on programs and carry information from one to another; and by a joint committee for program and project planning.

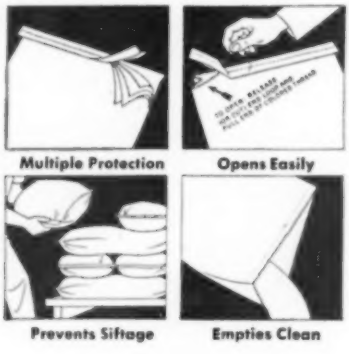
Specific Areas Pictured

REPORTS of the other five scientists on the day's program dealt in detail with the grassland situation in specific areas and possibilities for increasing distribution of fertilizer to further such improvement programs.

Examples were cited showing how farm income has been improved through proper fertilization and management of grasslands and the marketing of grassland products in the form of meat and milk. In general, confirmation was given Dr. Dodd's report of the growing interest everywhere in grassland farming while, it was also pointed out, there is also a

(*Turn to Page 115*)





AND IN THIS CASE, it's all the good Multiwall Specialists coming to the aid of American manufacturers whose packaging problems are increasing with the national emergency.

Union's Multiwall Specialists are anxious to help, with whatever changes of material, or design may be required because of the nation's demands —which in these days come first, of course.

Let a Union Multiwall Specialist study your packaging problem. There is no obligation, and his recommendation may help you meet pressing needs faster, better.

UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

Canners in 44th Meeting

The 44th annual meeting of the National Canners Assn. was held in Chicago Feb. 18-24. Attention was focused on the work of the Delaney Committee. H. Thomas Austern, NCA counsel, warned against hasty amendments which he said could "disservice the public interest in the development of better foods."

Other speakers discussed the role of pesticides in production of foodstuffs, and residues resulting from such use. C. A. Greenleaf, NCA, discussed the chemical problem; Dr. Russell Coleman, president, the National Fertilizer Association, talked on "Fertilizers in Relation to Food Consumption." Insecticides were discussed by Drs. G. C. Decker, Illinois Natural History Survey and L. P. Dittman, Md. Experiment Station.

Dr. Charles E. Palm, Cornell University, Ithaca, N. Y., told the group that pest control is recognized as an important phase in the production of raw materials for the food processing industry, and that right now the most effective array of pesticides in the industry's history is available for use.

However, uses of these pesticidal materials pose a number of problems, he pointed out, including the effectiveness of the product, consideration of possible off-flavor reactions and residues on the commodities treated, safe use for the operator and the confinement of toxic materials.

He said that purity standards of processed commodities are tied in with effective pest control, but that such control is dependent to a considerable degree with the method of application.

Tolerances for toxic residues will be issued shortly from the wealth of data from the recent Food and Drug Administration Hearings in Washington, he said. The protection of the public health is of much concern to the pesticide industry.

•

CSC Appoints S. T. Ellis

Sidney T. Ellis has been appointed assistant to the president of Commercial Solvents Corporation, it has been announced by J. Albert Woods, CSC president. Mr. Ellis' principal responsibility will be in connection with the company's development program.

A former officer of W. R. Grace and Co. in charge of engineering and technical activities, Mr. Ellis worked with the company's industries in the United States and South America and in the development of new projects.

SIDNEY T. ELLIS

During the war, he was a Lieutenant Colonel in the Army Engineer Corps.

•

Knipe, Union Bag G.S.M.

James L. Knipe, vice-president in charge of corrugated container sales and a member of the board of directors has been appointed general sales manager of the Union Bag and Paper Corp., New York, the company has announced.

•

Davison Advances Bachman

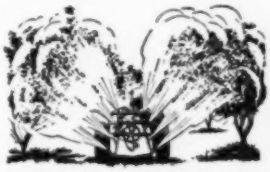
Appointment of Dr. Paul W. Bachman as Director of Research and Development of the Davison Chemical Corporation, Baltimore, as part of an expanded research program has been announced by M. G. Geiger, executive vice president of the chemical concern. Dr. Bachman, a graduate of Johns Hopkins University, has been with the company since 1949, joining Davison as manager of development planning after previous service with Commercial Solvents Corporation.

FARMERS GROW BETTER CROPS AT LESS COST *with*

John BEAN SPRAYERS

ROUTING CORN BORER is a job for the John Bean self-propelled HI-LO sprayer. Clearances up to 6 feet permit use in tall corn to get after second brood borer. Boom height is adjusted by driver while spraying. When you sell the Hi-Lo you offer the most efficient corn sprayer there is.

LIVESTOCK PARASITES are quickly controlled with a John Bean high pressure sprayer. The spray gets down through matted hair to the hide where it gives better, longer-lasting protection. Increased meat and milk production make ownership of a John Bean sprayer a "must".



AUTOMATIC ORCHARD SPRAYING with one of the three types of John Bean sprayers saves labor, saves time, and permits one man to thoroughly cover up to 75 acres a day. Fruit growers in your area want John Bean equipment to get better fruit at less cost.

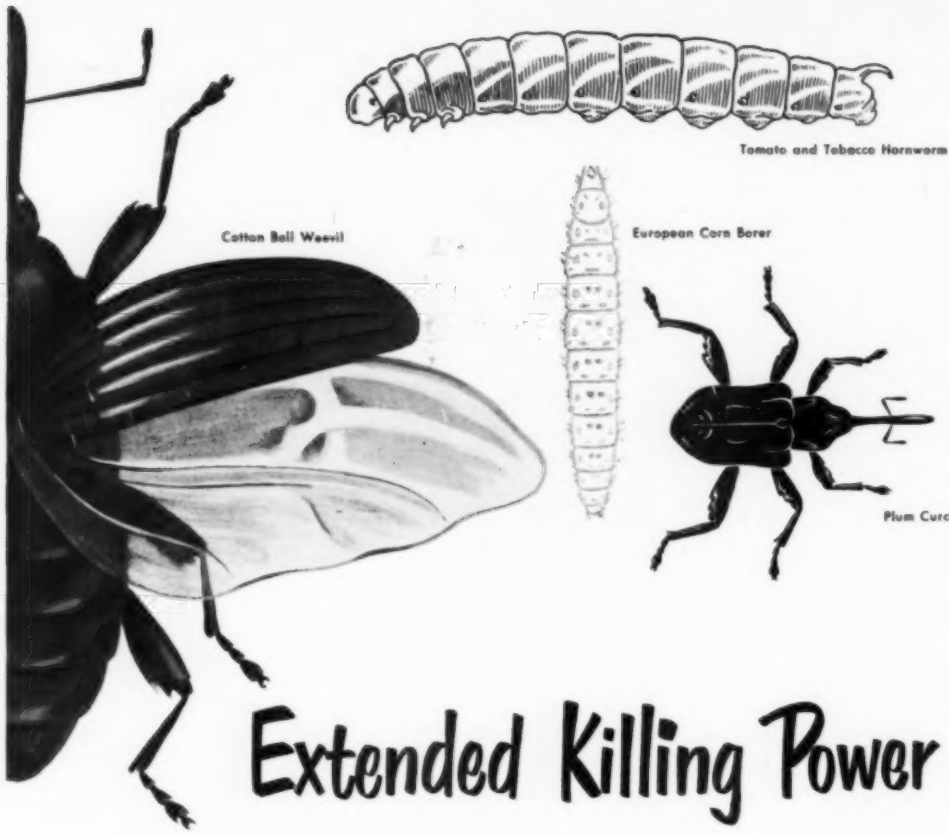
WEED CONTROL is fast and effective with a low-cost John Bean tractor-mounted sprayer and boom. Pump mounts quickly on tractor power-take-off so there is no interference with other farm operations. The Bean tractor mounted sprayer presents a real sales opportunity for you.

John Bean dealers have many other sprayers and Farm equipment to help them build sales and profits . . .

Spartan portable sprayer: The Ranger for brush and weed control: All Purpose farm sprayer: Speedsprayer: Automist: Rotomist and more. Write for complete information on the John Bean line.

fmc

John BEAN
Lansing 4, Michigan
Dept. AC-3
Division of Food Machinery & Chemical Corp.



Extended Killing Power

ARMOUR STICKER keeps insecticides on the plant longer!

Every year the American farmer spends thousands of dollars for insecticides and fungicides that are washed off the plant foliage before they give maximum protection from insect and disease damage. The use of Armour Sticker now makes it possible to guard against this loss.

Armour Sticker consists of natural animal proteins fractionated and blended to exact specifications for solubility, adhesiveness, light sensitivity and water resistance. According to Crop Protection Institute Bulletin No. 72 by Dr. B. Elwood Montgomery, entomologist at Purdue University, "Chemical analyses indicate the original deposit from a spray or dust on slick foliage such as peach, corn, etc., is increased materially (as much as 100%) by the addition of Armour Sticker to the mixture."

Coverage — Armour Sticker not only increases the deposit of the pesticide, but it also gives more uniform coverage of the foliage. This uniform film results in better control of insects and disease and also reduces burning from "spot-type" deposits.

Reduced Run-Off — Armour Sticker's high initial deposit and even coverage insures a minimum amount of run-off. Chemical analyses, visual ratings and tests of the toxicity of residues to caged insects indicate an improvement in the retention of effective deposits by the addition of Armour Sticker to dusts and sprays.

Weatherability — When an insecticide containing Armour Sticker is applied to foliage and exposed to light for two to three hours, it becomes water-resistant and capable of withstanding rainfall and wind for a prolonged period of time.

Removal of Residues — Armour Sticker's smooth, even cover insures easier residue removal, with either brushing or washing.

Compatibility — Armour Sticker is compatible with all inert materials, as well as all commonly used fungicides and insecticides such as DDT, chlordane, lead arsenate, parathion, methoxychlor, sulphur, mercuric and copper compounds and the carbamates.

Toxicity — Four years of field use has proven Armour Sticker to be non-toxic to plant and animal life.

Armour Sticker is a product of eight years of intensive research and has been tested on all types of crops. For the past two years commercial growers have been successfully using it. Armour Sticker can help extend the killing power of your insecticide, fungicide or herbicide.

Armour Sticker is available in any quantity, packaged in 100 pound containers. Write today for detailed information.

ARMOUR *Adhesive Division*

Armour and Company • 1355 West 31st Street • Chicago 9, Illinois

Suppliers' Bulletins

Thanite Bulletin Issued

A new folder describing "Thanite", toxicant used in space and residual sprays, has been issued by Hercules Powder Co. The product is a terpene chemical possessing quick knockdown properties. In livestock sprays, it not only kills flies by direct spraying, but acts also as a repellent against stable fly, horn fly and housefly, according to the makers. Thanite at concentrations of 3% to 4% in a suitable type base oil is effective as livestock spray, the company states. Copies of the booklet are available from the company, 970 Market St., Wilmington 99, Delaware.

•

Mixing, Blending Catalog

Its line of agitating and mixing equipment, kneading and blending units and grinding and classifying equipment is described in a catalog issued recently by the Patterson Foundry & Machine Co., East Liverpool, Ohio. The booklet, designated as catalog CEC-50, presents both illustrations and full descriptions of the equipment offered by the company. It is available upon request.

•

Plastic Coatings Described

Casey & Case Coating Co., Maywood, California, have just issued an illustrated bulletin on vinyl plastic coating, manufactured by them, for the control of corrosion on exteriors of steel, concrete, brick, formed block and plywood structures and as a tank lining. Specific properties are given, a chemical resistance chart is included, as well as valuable information concerning application. This bulletin will be supplied upon request made on letterhead of any interested user. Address the company, P. O. Box 151, Maywood, Calif.

•

Offers New Blower

A new orchard spray distributing blower based on the aqua-jet atomization principle has been announced by Hurst Industries, San Jose, California. This unit is equipped with six aqua-jet heads, three on each side which introduce finely atomized spray material into the air stream of

a fan-type blower. The use of the auxiliary air-stream permits application of the aqua-jetting principle in converting sprayers having insufficient capacity to operate the direct-projection aqua-jet boom.

According to Gordon F. Hurst, president of the concern, this new blower, designed primarily for one-man spraying operation, is readily attachable to any type of high pressure sprayer, converting it for use with concentrates and semi-concentrates.

Combination of the blower and aqua-jet principles is said to give improvement both in uniformity of distribution and in length of spray projection. Distribution of spray in amounts as small as four gallons per minute can be made to reach from twenty-five to forty feet it is said. The self-contained unit is directly connected to an air-cooled engine.

It is explained that this conversion is actually a sprayer plus a blower booster. The six aqua-jet heads, when operated without the fan and at 300 psi or higher, create an air-draft having exceptional spray reach and distribution on capacities of 15 gpm or higher.

Literature on the machine is available from the company, address above.

Sturtevant Mixing Catalog

Sturtevant Mill Co., makers of fertilizer dry mixing machinery, have issued a new booklet illustrating various units manufactured by the firm. Included in the catalog are drawings and photographs of combination mixing and material handling units; single and double elevator mixing units; dry batch mixers; "bucking broncho" screens; hammermill pulverizers; tailing knives; weighing units and custom-built steel elevators. The 16-page booklet, entitled "Sturtevant Fertilizer Machinery", is available from the company, 123 Clayton St., Boston 22, Mass.

•

8 Monsanto Booklets

Monsanto Chemical Co., St. Louis, has available eight booklets describing its line of insecticides and herbicides, as well as giving suggestions on use of such. The booklets are: "Controlling Weeds with Chemical Sprays"; "Chemical Weed Control on Small Grains"; "Chemical Weed Control in Orchards and Vineyards"; "Chemical Weed Control on Right of Ways"; "Handle Parathion Safely"; "Bulletin 0-52" (Niran); "Bulletin 0-46" (Nifos-T); and "New Booklet on Santobane". Address requests for literature to Monsanto Chemical Co., Organic Chemicals Div., 1700 S. Second St., St. Louis 4, Mo.

•

NPA Question-Answer Book

The National Production Authority has issued a pamphlet listing 85 questions and answers covering inventory control and priorities. The booklet brings up many queries in the minds of manufacturers of wide ranges of materials, including chemicals. Copies are available from the National Production Authority, Washington, 25, D. C.

•

Spraying Trees With DDT

The agricultural chemicals department of Pennsylvania Salt Mfg. Co., has just issued a new service bulletin describing safe methods of spraying shade and ornamental trees with DDT emulsion concentrate. The

(*Turn to Page* 114)

YOU CAN MAKE

BETTER CONCENTRATES WITH...

TRITON EMULSIFIERS

If you formulate emulsifiable concentrates,
you're already using TRITON surface-active agents—or you
are a potential customer.

Either way, you will find Rohm & Haas ready to help solve
your particular problems in making superior concentrates.

In using TRITON emulsifiers, you benefit by the years
of Rohm & Haas experience in the chemistry of emulsions
and in the practical know-how of today's
complex agricultural chemicals.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

TRITON is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

Technical Briefs

New Herbicide Tested

In tests with a large number of compounds, sodium 2,4-dichlorophenoxyethyl sulfate was found to be relatively non-toxic when applied directly in aqueous solutions of low concentration to the foliage of plants or to germinating seeds but to be highly herbicidal when used in combination with soil. Sterilization experiments showed that the effectiveness is largely the result of biotic action. Lack of injury from spray or dust applications to foliage is in marked contrast to such applications from 2,4-D. Danger of injury to adjoining crops from drift, therefore, is not a factor when sodium 2,4-dichlorophenoxyethyl sulfate is used.

Studies of the rate of disappearance of the new herbicide in soil under greenhouse conditions have indicated that the time required ranges from 12 to 30 days when 1 to 10 lb. acre is applied.

In large scale tests on sweet corn (var. Golden Cross) the best weed control was obtained when sodium 2,4-dichlorophenoxyethyl sulfate was applied several days after the germination of weed seeds had begun. Good control of broad-leaved weeds was obtained with a 2 or 3 lb. per acre application when used the day of planting, or four or seven days later. Best contol of crab grass was obtained when the application was made four days after fitting the soil. Good weed control was obtained in an established planting of asparagus when sodium or calcium 2,4-dichlorophenoxyethyl sulfate was applied at 2 lb. per acre at three intervals during the cutting season, and again at the end of the cutting season, and without the customary practice of hilling during cultivation. Asparagus yields and quality were not affected by these treatments.

These results showed that sodium 2,4-dichlorophenoxyethyl sulfate is a valuable addition to the chemicals now available for use as herbicides.

—Summary of "Herbicidal Properties of Sodium 2,4-dichlorophenoxyethyl Sulfate", by L. J. King, J. A. Lambrech and T. P. Finn, in *Contributions from Boyce Thompson Institute*, October-December, 1950.

•

DDT-BHC in Soil Studied

How frequently and for how long some of the new chemical insecticides can be applied to crop land without damaging crop yields, is the serious question that USDA plant pathologist Arthur C. Foster posed before the Southern Agricultural Workers Association in Memphis in February.

Five years of research investigations at the Department's Plant Industry Station, Beltsville, Md., working with a wide range of dosages including some excessive dosages, have indicated that some of the new insecticides remain suprisingly toxic in the soil, while others do not. One hundred pounds of DDT per acre or more applied to soil in 1945 has lost little of its toxic effect to date. Smaller amounts applied to crops as needed to control insects accumulate in the soil over the years.

Tests with a number of different field and truck garden crops showed, too, that a large proportion of them are in some degree sensitive to large dosages of insecticides mixed in the soil. All but three of 17 garden and field crops grown in greenhouse trials showed some sensitivity to DDT and seven were classed as highly sensitive. Growth of these crops was reduced as repeated heavy dosages accumulated in the soil or as increasingly large amounts were applied.

The research findings brought up questions about the heavy, continuous use on the same land of the more stable insecticides, especially DDT and technical BHC. Mr. Foster emphasized the importance of avoiding careless, excessive, or improper use, and went on to suggest the desirability of looking for effective substitutes.

DDT, the first and most widely used of the post-war insecticides, was studied more extensively than others. It was found that heavy applications of DDT (about 30 pounds per acre per year) could build up soil accumulations in 3 to 5 years that would damage the more sensitive crops. Growth of rye in soil from under peach trees that were sprayed 3 years with DDT and 1 year with technical BHC, was reduced about 30 percent by the toxic build-up of insecticide residues in the soil. Some soils that get applications of about 10 pounds of DDT per acre per year may become harmful to sensitive crops within 5 to 10 years.

Limited trials showed technical BHC to be less stable than DDT, but because of its high toxicity in the soil, it is capable of forming damaging accumulations if used frequently at heavy rates. Toxaphene and parathion, however, were found to be so unstable in the soil that they are not expected to accumulate there to a harmful degree following recommended use.

Tests in mineral and muck soils common to eastern United States showed that DDT could reach harmful levels in either type, although much more could be applied to the muck without injury to crops, than was true for the mineral soils.

•

Pear Psylla Control

Sprays applied early in the spring when the first fruit buds are beginning to open will protect pears against injury from the psylla, according to Prof. F. G. Mundinger, New York State Agricultural Experiment Station, Geneva, N. Y. The psylla is common in many pear orchards where it not only weakens the trees by its feeding, but also exudes a viscous fluid which drops on the leaves and fruit, causing a smudging due to the growth of a "sooty" fungus in the fluid. The insect resembles the common cicada only it is much smaller, measuring about a sixteenth of an inch in length.

IMPORTANT ANGLE ON FARM PROFITS

The profits of this farm and many others like it have a direct relationship to the products of our company. For successful, profit-making farming almost always calls for the wise use of the correct type of fertilizer.

Many of the most effective of these fertilizers contain potash — often Sunshine State Potash, a product of New Mexico. For potash is not only a soil nutrient, it is a crop strengthener as well. It helps to resist disease and drought, increases output, and improves conditions at time of harvest.

Reg. U. S. Pat. Off.
HIGRADE MURIATE OF POTASH
62/63% K_2O
GRANULAR MURIATE OF POTASH
50% K_2O
MANURE SALTS 20% K_2O MIN.

UNITED STATES POTASH COMPANY, *Incorporated*, 30 Rockefeller Plaza, New York 20, N. Y.

"The pear psylla may be controlled by a dinitro spray in early spring when the first fruit buds are beginning to open," advises Professor Mundinger, who warns, however, that the spray should not be used after much green tissue appears. "Elgetol" may be used at the rate of three-fourths to one gallon in 100 gallons of water. "DN-289" or "Elgetol 318" are effective at 1.5 to 2 quarts per hundred gallons. These sprays will kill most of the eggs and adult psylla, he says .

Parathion used at the rate of one hundred pounds of a 15 per cent wettable powder in 100 gallons of water looks promising as an early spring application, but care must be exercised in handling parathion, and the manufacturer's precautions should be followed.

A summer spray is sometimes needed to control psylla, especially if the early spring spray is not used, it is said. The summer treatment should be made about ten days after the petals fall. Nicotine sulfate at the rate of one pint in 100 gallons of water, with a little soap or hydrated lime, or rotenone powder at the rate of two pounds with two quarts of summer oil emulsion in 100 gallons of spray will give good results. Parathion and other organic phosphorus sprays also gave excellent control in summer tests.

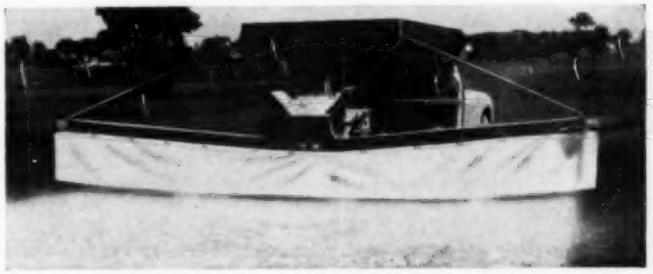
•

Features "Organic" Article

American Cyanamid Co., New York, has issued its winter edition of "Cyanagrams", featuring an article by Dr. Emil Truog, University of Wisconsin, entitled, "Which: Organic Compost or Commercial Fertilizers?" The author points out the need for both types of fertilization, but denies that application of commercial fertilizers is corrosive or toxic to soil bacteria and earthworms, as is sometimes claimed. Rather, Dr. Truog states, "Experiments have shown that the application of commercial fertilizers tends to increase the numbers of earthworms and bacteria in soils." In conclusion, he says that there may be advantages for the city gardener to make some compost for improving the physical condition and fertility of the soil, and then to supplement this with some commercial fertilizer. However, for the farmer with a considerable acreage, he said that the compost method will usually be "neither feasible nor economical." The needed organic matter can and should be supplied as a by-product of regular good farming practices which include the application of lime and fertilizers when they are lacking."

National Grassland Plan

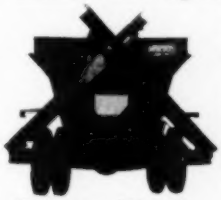
The U.S. Department of Agriculture has announced a National Grasslands Program similar to those carried out in several states during the past two seasons. The program will be initiated this year and will have the support of the combined efforts of the U.S.D.A. agencies, the Land Grant College research and extension staffs, agencies interested in agriculture, and the fertilizer industry.



Why is Hercules

the ONLY spreader that gives uniform distribution?

If you *throw* a handful of fertilizer into a field, the heavy bits naturally go farther than the fine powders—you get *uneven* distribution. You can see for yourself why any "spreader" that *throws* lime and fertilizer *is bound to give uneven distribution.* That's why Hercules uses an entirely different principle to build a spreader that actually *spreads* fertilizer, instead of throwing it. With this exclusive Hercules principle, chain conveyors pull the material across a diagonally-cut distributor plate, so that it drops uniformly at all times.



Discharge arms fold quickly and easily for highway travel.

What's the result? Better crops. More profits. No more soil burn. No spotty concentration of materials. No waste distribution. Lime and fertilizer spread evenly, no matter what the weather, in 20-foot swaths. Gives accurate quantity control from 200 lbs. to 8000 lbs. per acre. Spreads all types of agricultural limes and fertilizers, dry or moist.

Get Hercules— the only spreader that SPREADS fertilizer instead of throwing it!

HERCULES STEEL PRODUCTS CORPORATION
Dept. 304, GALION, OHIO

Please send me—

☐ More information on the revolutionary new Hercules Spreader.

☐ Details on how I can get a profitable dealer franchise for the new Hercules Spreader.

NAME_____

P. O. ADDRESS_____

CITY_____ STATE_____

Hercules
STEEL PRODUCTS CORP.
GALION, OHIO

Special Report

on One of the World's Most Useful Insecticides

ORTHO Lindane*

*Approved name for the "pure Gamma isomer" of Benzene Hexachloride, a most versatile insecticide.

Effective Multi-Purpose Uses of ORTHO Lindane:

For farming and ranching — Controls flies and other insects in dairy barns — external animal-parasites — mange mites, lice and ticks on sheep, cattle, hogs and horses — scab and sarcoptic mange.

For crop pest control — *ORTHO* Lindane is being widely used in control of many crop pests and with unprecedented success for the control of wireworms and other soil insects by seed treatment—also controls food and grain storage insect pests.

For household pests — Kills insects three ways; by contact, vapor action and stomach poisoning. Effective control of flies, mosquitoes, lice, roaches, silverfish, bed bugs, ants, clothes moths, carpet beetles, spiders, etc. *ORTHO* Lindane in combination with DDT, Pentachlorophenol, other chlorophenols and petroleum oils gives effective termite control.

Check These ORTHO Lindane Advantages:

High Safety Factor — Approved by the USDA for lice and mange control on dairy cattle. Shows no contamination in milk when properly applied. Kills poultry insects by contact and does not taint eggs or meat when properly applied. Even used by dermatologists for human itch, lice and scabies. Not cumulative and practically odorless. Any taken in by a warm-blooded animal is eliminated.

Small Amounts Needed for Good Control—Only 1 to 2 lbs of *ORTHO* Lindane required, where up to 20 lbs. of DDT or Methoxychlor would be necessary.

The Story of ORTHO Lindane

This product was developed after years of *ORTHO* research. After its discovery, the makers of *ORTHO* products made hundreds of tests with "pure Gamma isomer" formulae. In July, 1949, the United States Department of Agriculture approved and named the 99% "pure Gamma isomer" Lindane. The name Lindane cannot be used for material not meeting all the properties specified for this chemical. Anyone who claims his product contains Lindane must see that it meets these very high purity standards. The name Lindane cannot be applied to low purity BHC. *ORTHO* Lindane in technical form (99%) is available from California Spray-Chemical Corporation. It is a white, granular, free-flowing material easily handled and readily subject to wettable powder, dust, and liquid formulations.

Specify ORTHO Lindane

Write for free informative booklet containing full information and technical data on the many uses of *ORTHO* Lindane. Address a card or letter to: California Spray-Chemical Corp., P.O. Box 129, Maryland Heights (St. Louis) Missouri.

ORTHO
SCIENTIFIC PEST CONTROL

ORTHO T.M. REG. U.S. PAT. OFF.

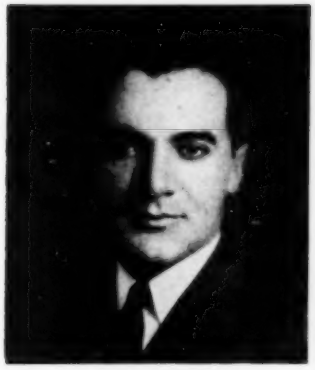
CALIFORNIA SPRAY-CHEMICAL CORPORATION
RICHMOND, CALIF.

World Leader in Scientific Pest Control

Chapman Expands Pesticide Output

ERECTION of a plant addition to double its agricultural chemicals capacity has been announced by the Chapman Chemical Company, Memphis, Tennessee. The company, widely known in the field of wood preservation and sapstain control, established its agricultural chemicals division in 1946 with R. C. Harnden as manager. The activities of this department are principally in agricultural insecticides, weed killers and defoliants, with particular emphasis on cotton insecticides and insecticides for control of various pests of spring grains, legumes, tobacco and soybeans. Industrial weed killers are also supplied by Chapman to many types of industries, including railroads, public utilities and sawmills. Plans are now being made to market defoliants for cotton and soybeans.

The company was founded in 1933 by A. Dale Chapman, a graduate of the University of Minnesota. The first years of the company's activities centered around the manufacture of wood-preserving chemicals, and in 1938 utility poles and cross arms treated with pentachlorophenol began to be used generally. Chapman is sole sales agent for this material, manufactured by Dow Chemical Co., Midland, Mich.



A. DALE CHAPMAN

R. C. HARNDEN

A modern laboratory is maintained by Chapman Co., in charge of Dr. Eldon Behr.

•

Potomac APS Branch Meets

The eighth annual meeting of the Potomac Division of the American Phytopathological Society was scheduled to be held at the Plant Industry Station of the U.S.D.A., February 27 and 28. The advance program called for five sessions with the following chairmen: C. E. Cox, W. J. Zaumeyer, J. W. Heuberger, and M. E. Fowler. The annual banquet was scheduled for Tuesday evening, Feb. 27, at the University of Maryland cafeteria, College Park. An illustrated talk on "A Pathologist's Summer in European Forests" was to feature the program that evening. Lee M. Hutchins was to be the speaker.

Officers of the Potomac Branch are, C. E. Cox, president; S. P. Doolittle, vice-president; J. B. Demaree, secretary-treasurer; and C. L. Lefebvre, counselor. The program committeee was composed of W. J. Zaumeyer, chairman, Muriel J. O'Brien and C. V. Lowther.

•

Jap Beetle Hearing Mar. 30

A public hearing to consider the advisability of either revoking the federal Japanese beetle quarantine or extending it to include the States of Georgia, Illinois, Indiana, Kentucky, Michigan, North Carolina, and South Carolina has been scheduled by the Secretary of Agriculture at Washington, D. C., on March 30.

•

BEPQ Equipment Center

The Bureau of Entomology and Plant Quarantine has just established an Equipment Management Center at Cimarron Field, near Oklahoma City, to provide for better coordination and utilization of its equipment, particularly aircraft, pest control machinery, etc. Kenneth Messenger, who has handled equipment development work in the Bureau for a number of years, will be in charge of the new center.

In the field of ground application equipment for pesticides, the Equipment Management Center will maintain a file on the development and availability of new types of machinery, and will advise Bureau field stations on suitable machines for their use.

With respect to aircraft, the new equipment unit will have direct responsibility for procurement and modification of aircraft used by the Bureau. It will help develop specifications and contracts for operations in which the Bureau cooperates, and will assist in the inspection of aircraft and supervision of pilots engaged in such operations. The Center will cooperate closely with the CAA Aeronautical Center, located nearby, in the development of standards for the benefit of custom spray operators throughout the country.

Review your aldrin needs Now!

1951 DEMAND IS SKYROCKETING!

Last year (aldrin's *first*) Over 2,500,000 pounds of this potent pest killer were used . . . 2,000,000 pounds on cotton alone. This news has travelled fast throughout the country and is being augmented by an advertising program directed to your insecticide customers.

About aldrin:

Aldrin is *the most powerful killer* of boll weevils, grasshoppers, thrips, tarnished plant bug, rapid plant bug, and cotton fleahopper yet formulated and proved on a belt-wide scale.

Aldrin controls these pests with *just 4 ounces* per acre on mature cotton . . . one to two ounces in early season . . . and grasshoppers with only *2 ounces per acre!*

Every available pound of Aldrin s-t-r-e-t-c-h-e-s your ability to formulate superior insecticides.

aldrin kills in hours instead of days!

Pests die within a few hours after aldrin-izing. Growers are enthusiastic about such fast action which cuts crop damage.

Less risk from rain

. . . after a few hours most of the lethal work is completed . . . even if it rains next day growers don't have to re-do their work.

IMPORTANT . . .

Our best advice is to review your 1951 needs now, and get the order in as early as you possibly can.

aldrin

SHELL CHEMICAL CORPORATION

Aldrin is manufactured by Julius Hyman & Co., and is distributed by Shell Chemical Corporation, 500 Fifth Avenue, New York 18, N.Y.

Aldrin is available under the brand names of leading insecticide manufacturers. Consult your local dealer and county agent.

A 7-Point Score for Barden Clay!

The Low-Cost Scientific Insecticide Diluent

1. DISPERSION

In dusts, Barden* Clay's fine particle size creates extremely effective dispersion of the toxicant. In sprays, Barden remains in suspension longer.

2. ABRASION

Barden's very low grit content practically eliminates pipe and nozzle wear. It is much less abrasive than other diluents and carriers as shown by the following results, by standard testing procedure:

DILUENT	WEAR LOSS (MILLIGRAMS)
Barden	73
Talc	672
Fuller's Earth	756
Pyrophyllite	2910

3. COVERAGE

In ground and airplane dusting, Barden Clay shows high deposit on both lower and upper surfaces of the leaf. A recent plane dusting measurement showed deposit on under side of leaf to be 70% of upper side deposit—much higher than most diluents.

4. RETENTION

After seven days with three rainfalls, Barden ground dusting showed 44% upper retention, 72% retention on under side. Outstanding is a recent report on plane dusting which showed 100% underside retention after five days, no rain.

5. MORTALITY

Field and laboratory tests by leading insecticide manufacturers and agricultural stations prove Barden to be the foremost diluent and carrier for high mortality. Included in this work were all of the toxicants in general use today.

6. UNIFORMITY

Barden Clay is mined from an abundant deposit by modern mechanical methods. The latest in refining equipment, plus technical skill and laboratory control, guarantees a constant, uniform diluent-extender for the insecticide mixer to give fast, accurate batching of dusts and sprays.

7. ECONOMY

A low-cost diluent, Barden contributes to further economy by efficient dispersion of the toxicant, low abrasiveness, and outstanding efficiency in coverage. Huber's research and development program assures Barden Clay users of every modern, scientific advantage. Such Huber developments as Unit Loads, Hubernest Pallets and "De-Aerated" Bags demonstrate our constant efforts to help our customers economize, even in material handling and storage problems.

Samples Available Upon Request

HUBER

J. M. HUBER CORPORATION, 100 Park Avenue, New York 17, N. Y.
World's Largest Producer of Aerfloted Kaolin Clay

FOR DUST OR SPRAY ... USE
THE LOW-COST SCIENTIFIC DILUENT

BARDEN CLAY

* Reg. U. S. Pat. Off.

DEFENSE PRODUCTION

DIRECTORS

W. W. ALLEN
Manager, Agricultural Chemical Sales, The Dow Chemical Company, Midland, Mich.
W. C. BENNETT
President, Phelps Dodge Refining Corporation, New York.
J. HALLAM BOYD
Exec. Vice-President, Commercial Chemical Company, Memphis, Tenn.
ERNEST HART
President, Niagara Chemical Division, Food Machinery & Chemical Corporation, Middleport, N. Y.
LEA S. HITCHNER
Executive Secretary, NAC Association, Washington, D. C.
JOHN PAUL JONES
Assistant to General Manager, Stauffer Chemical Company, New York.
GEORGE F. LEONARD
Exec. Vice-President and Treas., Tobacco By-Products & Chemical Corporation, Inc., Richmond, Va.
PAUL MAYFIELD
Assistant General Manager, Hercules Powder Company, Inc., Wilmington, Del.
A. W. MOHR
President, California Spray-Chemical Corporation, Richmond, California.
JAMES McCONNON
Vice-President, McConnon & Company, Winona, Minn.
E. H. PHILLIPS
Director of Purchasing, GLF Soil-Building Service, a Division of Co-operative GLF Exchange, Inc., N. Y.
FRED SHANAMAN
President, Pennsylvania Salt Manufacturing Company, of Washington, Tacoma, Wash.
RUSSELL B. STODDARD
Coordinator of Insecticide Operations, U. S. Industrial Chemicals, Inc., New York.
F. S. WASHBURN
Director, Agricultural Chemicals Division, American Cyanamid Co., New York.
BYRON P. WEBSTER
Vice-President,— Chipman Chemical Company, Inc., Bound Brook, N. J.

NAC has established special bulletin and advisory services to keep members informed of defense production activities as they affect the agricultural chemical industry.

Furthermore, the NAC staff and Defense Production Committee regularly present, to the government agencies concerned, the views and needs of the Industry as they relate to the nation's defense program.

The Defense Production Program is but one of the many phases of NAC service to the Industry.

Membership in NAC is an investment which pays!

National Agricultural Chemicals Association

Barr Bldg., 910 17th St., N.W. Washington 6, D. C.

OFFICERS

ERNEST HART, *President*
A. W. MOHR, *Vice-President*
LEA S. HITCHNER, *Executive Secretary and Treasurer*

New Books . . .

Practical Dairy Bacteriology, by P. R. Elliker. Published by McGraw Hill Book Co., Inc., N. Y. 390 pages, cloth binding, price $4.00.

The introductory chapters of the book deal with the general nature and activity of microorganisms, ie their structures, distribution, nutrition, growth, inhibition and cultivaton. Microorganisms in milk and methods for determining sanitary quality are then described and a description of equipment presented. The remaining chapters deal with the various dairy products, considering the steps in manufacture, determination of quality, control tests on products and animals, equipment for manufacture, testing, handling etc.

A section on the microbiology of milk and cream reviews the sources of milk contamination, such as from barn air, coat of cow, flies and utensils in general. Precautions and methods of preventing contamination are discussed. Diseases transmitted through milk by infected cows and the treatment of infected animals are also treated in this section.

The final chapter "Cleaning Dairy Equipment" considers the nature of cleaning operations required, composition and properties of dairy cleaners, and effects imparted by some ingredients of dairy cleaners. Germicidal activity of the quaternary ammonium compounds is described and methods of cleaning and germicidally treating dairy utensils discussed.

The text is well illustrated with photographs, line diagrams and tables. A bibliography at the end of each chapter permits the researcher to investigate the subject further.

Agricultural Chemistry, A Reference Text, by Donald E. H. Frear, professor of agricultural and biological chemistry, Pennsylvania State College, editor; and contributors. Volume I, first edition, published by D. Van Nostrand Company, Inc., New York, price, $9.00, 812 pages. Divided into five parts, the book discusses the following: Part I covers some fundamental materials and processes common to plants and animals; part 2 discusses chemical processes of fundamental importance in agriculture; parts 3 through 5 take up the chemistry of plants, animals and soils. Under plant chemistry, metabolism, absorption, photosynthesis, plant pigments, utilization of carbohydrates, use of nitrogen compounds, and plant hormones are taken up. Animal chemistry describes various processes such as metabolism, absorption and utilization of inorganic substances and the vitamins. Soil chemistry is described under the minerals of the soil, colloids of the soil and organic matter in the soil. The book is written in highly technical language and is not

Announcing

HANDBOOK OF AGRICULTURAL PEST CONTROL

by Stanley F. Bailey

Professor of Entomology, U. of California

Leslie M. Smith

Associate Professor of Entomology, U. of California

At last a practical handbook has been prepared for use by the custom sprayer operator, the pest control operator, farm advisor, agicultural chemical salesman and field worker. This handbook covers the agricultural chemicals (insecticides, fungicides, herbicides, plant hormones, nutrient sprays, defoliants, etc), their rates of application, useful formulas, as well as chapters on fumigation, spray machines, toxicology, dusts and dusting, aircraft, and mosquito control.

Fundamentals and the basic data needed in making estimates, planning work, and *carrying out the application* of agricultural chemicals are compiled. Text book type discussion has been omitted purposely, to produce a strictly practical handbook. The book is pocket-sized (5 x 7½ inches), bound with a flexible leatheroid cover, for convenient practical use.

This new handbook will be out about April 15th. Orders placed now will be filled as soon as the books are off the press. Please send check with order. If not satisfied, return books to us in good condition within ten days, and your full purchase price will be refunded.

$3.25 in U. S. A. **$3.75 elsewhere**

INDUSTRY PUBLICATIONS

publishers

254 West 31st St.; New York City

meant for the layman. It is a comprehensive review of the subject, written for the chemist.

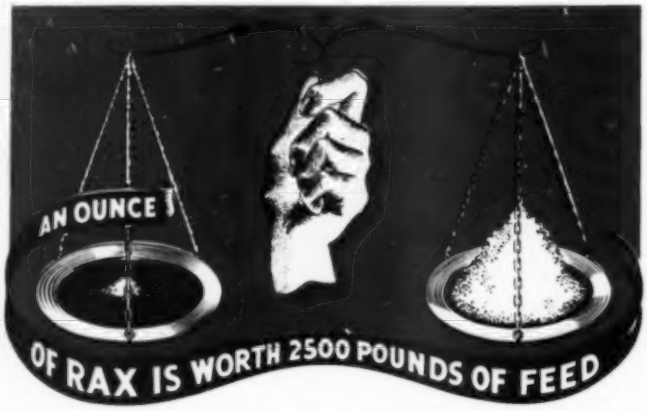
A German-English Dictionary for Chemists, by Austin M. Patterson, Professor Emeritus of chemistry, Antioch College, third edition, published by John Wiley & Sons, Inc., New York, price $5.00. This 541-page dictionary is for use among chemists, chemical engineers, physicists, biologists, geologists, etc.

Condensed Chemical Dictionary, fourth edition, by Francis M. Turner et al. Published by Reinhold Publishing Corp., New York. 726 pages, 6 x 9 inches, cloth binding, price $10.00.

Terms relating to chemistry and chemical industries are compiled in this text, with information on properties and uses, and notes as to manufacture, when the compounds are not produced naturally. A large number of chemical specialties sold under trade names or brand marks are included in this fourth edition bringing the total number of items in the list to about 23,000. Information on containers, shipping, regulations and safety instructions, discussed in previous editions, is brought up to date.

Forage Crops, by Gilbert H. Ahlgren, professor of farm crops, Rutgers University, first edition, McGraw-Hill Book Co., Inc., New York, price, $5.00, 418 pgs., graphically illustrated with photographs and charts. This book considers forage crops as those harvested by man and later fed to livestock. From this viewpoint, the subject matter is presented in the following order: (1) the historical and geographical development and influence of climate; (2) discussions of the various crops including alfalfa, red clover, alsike clover, ladino clover, and the sweet clovers, the lespedezas, soybeans and cowpeas, and others; (3) identification of the plants and seeds, mixtures, soil improvement practices, seedbed preparation, seed placement, companion crops, quality production and hay standards; and (4) miscellanous subjects as labor saving devices, growing and making silage crops, insects, diseases and plant-breeding contributions.

Diseases of Cereals and Grasses of North America, by Roderick Sprague, pathologist, agricultural experiment station, the State College of Washington, published by Ronald Press Co., New York, price, $7.00, 538 pages, illustrated with photographs and drawings. This book discusses the fungi, except for the smuts and rusts, in a taxonomic arrangement with fungi listed in alphabetical order under their classifications. The groups discussed, the phycomycetes, ascomycetes, bacidiomycetes, and the fungi impertecti, are introduced by a key for identification of members within the group, followed by a description of each of the fungi and the diseases they cause. The book contains a glossary of terms, which makes it easier to interpret by those not too familiar with the fungi as a class.



Figures don't lie! One ounce of RAX can kill 25 rats. It is estimated that 25 rats consume or damage 2500 pounds of feed and grain annually. Multiply that by the average rodent population that plunders your stored grain and feed, and you can see how great your crop loss actually is.

Swing the balance in your favor with RAX! RAX is a new Prentiss product that contains warfarin* (WARF Compound 42) and it kills by producing internal hemorrhage. It is a tasteless and odorless rodenticide that is easily fed to rats and mice, and its cumulative effect prevents any chance of accidental poisoning of humans or pets. RAX successfully controls a rat and mouse population and then helps prevent its rebuilding.

Farmers who have used RAX experimentally have reported easy, economical and safe control of rats and mice on the farm. Results from all over the country indicate that RAX is 85-20% effective in killing rats and mice.

* Distributed under U. S. Patent No. 2,427,578

DON'T MISS THE READER'S DIGEST MARCH WARFARIN ARTICLE

This important article is an absolute must for your March reading. Be sure you don't miss it!

PRENTISS DRUG & CHEMICAL CO.
FORMERLY
R. J. Prentiss & Co., Inc.
110 William St., New York, N. Y.
9 So. Clinton St., Chicago, Ill.

I'm interested in your RAX Powder Pest Control Program. Please send full details.

Name

Company

Address

City Zone State

Quarantine Hearing Coming

Extension of federal plant quarantines to include the Virgin Islands of the United States will be considered at public hearings to be held in Washington, D.C., on March 29, the Secretary of Agriculture has announced. The hearing will consider the advisability of enforcing in the Virgin Islands the foreign plant quarantines affecting importation of plants and plant products into the United States.

During the afternoon of the same day, a companion hearing will consider the necessity for adopting domestic plant quarantine regulations to govern the movement of plants and plant products from the Virgin Islands to either Puerto Rico or the United States mainland.

Until recently the Plant Quarantine Act was regarded as inapplicable to importations into, or shipments from, the Virgin Islands. These Islands are now regarded as a District of the United States within the scope of that Act.

•

No TVA Price Rise in '51

The Tennessee Valley Authority will not seek an increase in the price of its ammonium nitrate fertilizer, price administrator Michael V. DiSalle has been advised. The TVA price will remain at the January 1949 level. This is substantially below the level to which ammonium nitrate prices in general have recently been advanced.

TVA's decision to "hold the line" on ammonium nitrate is based on the fact that its 1949 prices are still sufficiently above costs to return a sizeable margin. TVA officials point out, however, that any unusual increase in production costs would cause the question of price to be reconsidered.

•

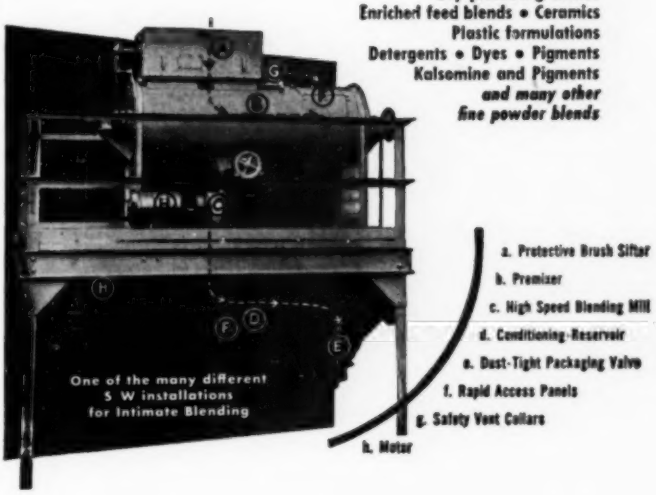
Roche Rejoins Mente

John R. Roche, who until last November had represented Mente & Co., Inc., New Orleans bag manufacturers, for some time in the Nebraska-Kansas-West Missouri territory, has rejoined the company, it has been announced. His headquarters will be in Kansas City.

LOOK WHAT'S NEW IN

intimate blending

for Agricultural Dusts
Brake Lining
Battery case formulas
Dry plastering blends
Enriched feed blends • Ceramics
Plastic formulations
Detergents • Dyes • Pigments
Kalsomine and Pigments
and many other fine powder blends


One of the many different S W installations for Intimate Blending
a. Protective Brush Sifter
b. Premixer
c. High Speed Blending Mill
d. Conditioning-Reservoir
e. Dust-Tight Packaging Valve
f. Rapid Access Panels
g. Safety Vent Collars
h. Motor

When specifications call for powder blends of high uniformity, Sprout-Waldron's *Intimate Blending Systems* provide the perfect solution. Engineered to individual needs, these versatile systems are indicated wherever powders 100 mesh or finer are to be blended to smooth-flowing, lump-free uniformity — especially formulas including liquids or fibers as well. Ruggedly constructed, the compact assemblies operate on the gravity flow principle and take up a minimum of floor space. They are misers on power consumption, too — are quiet, smooth-running, and clean. Dust-free operation is another vitally important S/W feature. Easy accessibility and simplicity of interior for cleaning, etc., assure advantages which have been developed through long practical experience. The minimum of moving parts means additional economies in maintenance. Sprout-Waldron specialists have successfully solved intimate blending problems in a great many widely different processing plants from coast to coast. Their expert advice is yours for the asking. It may help step up production, improve your product and working conditions in the plant, and increase profits. Write for Bulletin I-846 today! Address Sprout, Waldron & Co., Inc., 7 Waldron Street, Muncy, Penna.

Sprout Waldron
Manufacturing Engineers
MUNCY • PENNSYLVANIA

134

Horan to Select Committee

Representative Walt Horan of Washington State has been named by Speaker of the House Sam Rayburn, to replace Rep. Frank Keefe, Wisconsin, on the Delaney committee. The select committee, organized last year to investigate the use of chemicals in foods and food production, was seeking an appropriation of $75,000 to cover the cost of continuing the investigation during the Eighty-second Congress. This is considerably more than was asked for last year, and it is understood that some question will be raised regarding the need for this amount. The date for resumption of hearings was to be announced after the appropriation was granted.

Members of the committee, in addition to chairman John J. Delaney, New York, and the newly-appointed Mr. Horan, are: Thomas G. Abernethy of Mississippi, E. H. Hedrick of West Virginia, Paul C. Jones of Missouri, A. L. Miller of Nebraska, and Gordon L. McDonough of California.

•

Huber Department Moves

J. M. Huber Corporation's industrial products department has moved its New York offices to 100 Park Avenue where it occupies the entire twenty-first floor. This department handles the sales of Huber carbon blacks, rubber and paper clays, and rubber chemicals. The New York sales offices of Huber's Ink Division, and the company's purchasing and traffic sections are also located in the same offices.

•

NW Insect Conference Held

The tenth annual meeting of the Northwest Vegetable Insect Conference was held at the Imperial Hotel, Portland, Oregon, January 22-24, 1951. The conference membership is comprised of State, Federal and Dominion entomologists engaged in research or extension work on insects of vegetable and related crops in the State of Oregon, Washington, Idaho, Montana, and Utah; and Dominions of British Columbia and Alberta. Representatives from California and Alaska also were in attendance, in addition to the states named above.

H. C. Manis was chairman and C. L. Neilson, co-chairman of the conference. January 22 and 23 were closed sessions and January 24 was open to members of industry. K. M. King was discussion leader for insects attacking crucifer, carrots, lettuce, corn, celery and onions. Other discussion leaders were James R. Douglas for insects of beets, tomatoes, beans and hops; S. C. Crumb Jr. for insects of potatoes; H. E. Morrison, for soil arthropods and D. J. Crowley for insects of small fruits, berries, and ornamentals.

On the evening of January 23 a banquet was held for entomologists with H. M. Armitage as toastmaster. R. L. Webster, chairman of the Department of Entomology, State College of Washington, reviewed some of his experiences as an entomologist during the past 45 years; and L. B. Reid of the Division of Insects Affecting Truck Crops, U.S.D.A., Wash-

two PICCO HI-SOLV solvents

Ideal for INSECTICIDES and AGRICULTURAL SPRAYS

★ Increase the Effectiveness

★ Decrease the Cost

OF YOUR PRODUCTS

You can improve your sprays and at the same time cut costs, by using high-solvency, aromatic PICCO Hi-Solv Solvents. The analyses given below reveal characteristics that make these two Picco Hi-Solvs ideal for your use. Write for complete data and samples.

Typical Analysis	Hi-Solv 30	Hi-Solv 473
Distillation Range, °F	266—374	400—520
Specific Gravity	0.830—0.840	0.900—0.915
Color	Water White	Light Straw
Flash Point	80° F—TCC	180° F—COC

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION

Clairton, Pennsylvania

Plants at Clairton, Pa.; West Elizabeth, Pa. and Chester, Pa.

ington, D. C. discussed statistics in entomological research.

On the morning of January 24 the discussion leaders presented the results of the 1950 research work to members of industry at the open session which was held in the Junior Ballroom of the Multnomah Hotel.

Members of the executive committee for 1952 are H. S. Telford, Entomologist, State College of Washing, Pullman, chairman; H. E. Morrison, Entomologist, Oregon State College, Corvallis, co-chairman and David H. Brannon, Extension Entomology Specialist, State College of Washington, Pullman, secretary-treasurer.

The 1952 meeting of the conference will be held on January 21, 22 and 23 at the Imperial Hotel, Portland, Oregon.

•

Potash for Britain

Exploitation of rich potash deposits in the vicinity of Whitby (Yorkshire) England, may make Britain independent of foreign supplies of potash for the first time in history, according to word from England. British consumption of potash is currently 250,000 tons annually, and the Whitby deposits are estimated to be large enough to supply the country for many years.

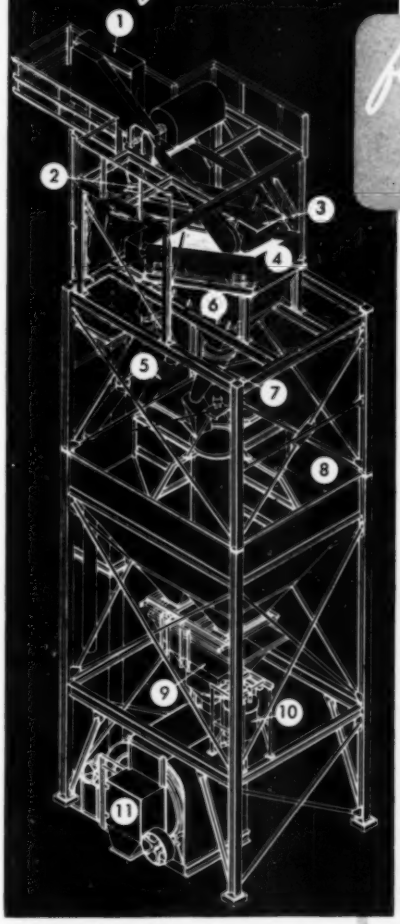
The deposit was discovered by the D'Arcy Exploration Co., a subsidiary of the Anglo-Iranian Oil Co. Thus far, no firm decision has been made regarding means of extraction, but it was regarded as likely that the salts would be brought to the surface by solution methods rather than by mining. The mineral will be processed at the new chemical works of the Imperial Chemical Industries at Wilton.

•

Lion Fertilizer Output Up

An increase in the company's output of anhydrous ammonia and nitrogenous fertilizers has been given considerable credit for Lion Oil Company's all-time record in net income for 1950, according to a preliminary report released in February by T. M. Martin, Lion Oil Co. president. Net income for last year was $13,988,244.96, or $5.98 per share; an increase of fifty-three percent.

Quick facts about JOHNSON fertilizer BLENDING PLANTS...



1. Chain bucket elevator handles up to 1000 cu. ft. per hour.
2. High-speed clod breaker reduces material to required size.
3. Self-cleaning belt conveyor feeds the pulverized material from clod breaker to screen.
4. Vibrating 4' x 10' separating screen controls the size of all material fed into hopper.
5. Reject pipes return oversize material from screen to pulverizer to bucket elevator for resizing.
6. Collecting hopper under screen charges pivoted distributor.
7. Full-revolving distributor feeds screened material from hopper into sectional bin.
8. Johnson 65 cu. yd. Step-by-Step Bin, with fast-flowing 60° bottom slopes, has four 15-yd. compartments arranged around 5 cu. yd. central tank.
9. Multiple-material weigh batcher, with 5,000-lb. dial-head scale, accurately weighs 5 or more fine-grained materials.
10. For adding liquids, semi-automatic solution weigh-batcher has a capacity of 500 lbs.
11. Mixing unit (2-ton capacity).

Developed to meet the special blending requirements of a large fertilizer manufacturer, this modern installation is typical of the many sizes and types of Johnson plants available for mixing and blending all types of materials . . . manually-operated or fully-automatic . . . engineered to meet your exact requirements. Your Johnson distributor can show you many time and labor-saving ideas on complete plants, or auxiliary equipment, that will increase your output and profit. See him, or write us today.

J150

Mail to: C. S. JOHNSON CO. CchampaIGN, ILL. (Koehring Subsidiary)

☐ Send us more data on Johnson fertilizer blending plants. ☐ Have Johnson distributor call.

NAME ..... TITLE ..... AG

COMPANY ..... DIV. .....

STREET .....

CITY ..... STATE .....

Also interested in: ☐ bulk phosphate storage plants ☐ aeration systems ☐ screw conveyors ☐ bucket elevators ☐ bins ☐ hoppers ☐ batchers ☐ clamshell buckets

Alabama Holds Course in Pest Control

A SPECIAL three-day short course on crop pest controls was scheduled for February 28 through March 2 on the campus of Alabama Polytechnic Institute, according to announcements by Dr. E. V. Smith, director of the Alabama Agricultural Experiment Station.

Groups participating in the short course include plant inspectors of the Alabama State Department of Agriculture and Industries, commercial dealers in insecticides and fungicides, aerial crop dusters, Alabama Flying Farmers' Association, and the Alabama Department of Aeronautics.

Control recommendations presented at the conference were to cover diseases and insect controls on crop plants, nursery stock and landscape plantings, and control of household pests. Attention was to be given to various weed-killing chemicals and methods of application as well as proper machinery design for dusting, spraying, and fumigating.

Some of the highlights of the scheduled program include discussions as follows: "The Role of Plant Pest Control in Our Agricultural Program," Dr. E. V. Smith: "Bed Sterilization and Plant Dips," J. A. Lyle, assistant plant pathologist, and W. A. Johnson, assistant horticulturist; "Defoliation of Cotton and Other Crops," E. H. Wilson, American Cyanamid Company; "Outlook for the Use of Weedicides in an Agricultural Program," Warren C. Shaw, USDA, Division of Weed Investigation, Beltsville, Md.; and "Characteristics of Some Common Weedicides," V. S. Searcy, assistant agronomist.

L. S. Hitchner, executive secretary, National Agricultural Chemicals Association was scheduled to discuss proposed Federal legislation on agricultural pesticides. Panel discussions of "Dangers and Precautions in the Use of Insecticides and Fungicides," and "Legal Aspects of Aerial Applications," were to be led by James W. Wirwille, Pennsylvania Salt Mfg. Company, and Robert G. Pitts, professor, Aeronautical Engineering, moderators, respectively.

•

NFA Publishes "Review"

National Fertilizer Association, Washington, D.C., has published its quarterly *Fertilizer Review* for January, February and March, 1951. Articles carried in the current issue include "Science vs Witchcraft" . . . a resume of the testimony before the Delaney Committee, illustrated with humorous drawings; "Some Highlights in the Development of the Mid-Atlantic Fertilizer Industry", by Vincent Sauchelli; a story of the NFA Mississippi meeting; the "World Fertilizer Supply and the FAO World Program" by G. J. Callister; and a review of recently published books on agricultural subjects. Editor of the *Review* is William E. Chace.

Stauffer
CHEMICALS
SINCE 1885

A BIG NAME IN
AGRICULTURAL CHEMICALS

Order your agricultural chemicals from the nearest conveniently located Stauffer sales office. Plants and warehouses in every major agricultural section permit Stauffer to offer rapid service on the following materials.

SULPHUR
Paste, Wettable, Dusting, Flowers, Burning

DDT • LINDANE • BHC • CHLORDANE
TOXAPHENE • PARATHION • ALDRIN • DIELDRIN
Wettable, Emulsifiable, and Dust Concentrates
Dust Mixtures

2,4-D
Amine and Ester Concentrates

POTASSIUM NITRATE
A convenient source of Potassium and Nitrogen in hydroponic mixtures

CALCIUM ARSENATE
BORAX

STAUFFER CHEMICAL COMPANY

420 Lexington Ave., New York 17, N. Y.
636 California Street, San Francisco 8, Cal.
221 No. LaSalle Street, Chicago 1, Illinois
824 Wilshire Blvd., Los Angeles 14, Calif.
Houston 2, Tex. • Weslaco, Tex.
Apopka, Fla. • N. Portland, Ore.

Quarantine Hearing Coming

Two hearings on plant disease quarantines are sheduled for March, according to announcements made by the U.S. Department of Agriculture. All federal plant quarantine regulations and orders affecting importation of cotton and cotton products will be reviewed at a hearing to be held in Washington on March 28; and a second hearing on quarantine of wheat is scheduled for March 30. The latter will consider the addition of 16 countries to the localities from which wheat and wheat products are prohibited entry into the U.S. because of flag-smut infection. The possibility of adding sweet clover seed, wheat straw and chaff and contaminated bagging to the commodities prohibited entry, will be discussed also.

The March 28 meeting is scheduled for 10 a.m. in room 509, U.S. Department of Agriculture Administration Building, 14th St. and Independence Ave., S.W., Washington, D.C. The March 30 hearing will be at the same location, but at 3 p.m.

•

Babcock Elected Hooker VP

J. Herbert Babcock was elected a vice-president of the Hooker Electrochemical Company, Niagara Falls, N. Y., at the annual meeting of the board of directors recently. The announcement was made by R. L. Murray, president. At the same meeting Charles H. Winkler was made assistant treasurer of the Hooker Company and T. F. Willers, comptroller.

•

Missouri Short Course

A conference and short course for Missouri florists was held February 20 and 21 at the Missouri Univerity College of Agriculture, Columbia. Discussions of greenhouse problems including disease and insect control were held. J. E. Smith, Jr., U. of M Department of Horticulture, was in charge of the event.

•

So. Ag. Workers Meet

The 48th annual convention of the Association of Southern Agricultural Workers was held February 5-7 at the Peabody Hotel, Memphis, Tenn. The program was built around the theme, "Science and our Changing Agriculture", with good agronomic practice and wise use of fertilizer materials being emphasized throughout. Dr. Richard Bradfield, Cornell University, Ithaca, N.Y., declared that with "American Know-How", we should easily increase our farm yields 50 percent within the next few years, and as knowledge increases, crop yields might be doubled in a hundred years.

W. A. Minor, assistant to the Secretary of Agriculture, in commenting on the program, told the Association of Southern Agricultural Workers at their recent Memphis meeting that "We can count upon rich returns in which the participating farmers, the people and the nation will share—in the immediate future and in the uncertain years which are further ahead."

Because of its phenomenal ability to produce smooth, ultra-fine grinds and blendings at remarkably low temperatures, more and more economy-minded manufacturers are turning to the MIKRO-ATOMIZER as a means of improving their products and lowering production costs.

The MIKRO-ATOMIZER has proved a boon to many manufacturers, particularly in the fine grinding of:

Chemicals	Drugs
Dyestuffs	Pharmaceuticals
Pigments	Sugar Mixtures
Insecticides	Food Mixtures
Sugar	Synthetic Resins
Cocoa	Cosmetics

The MIKRO-ATOMIZER has made possible grinding in the lower micron range without exorbitant production and equipment cost as compared with other available equipment.

No. 6 MIKRO-ATOMIZER

SEND FOR: New Illustrated MIKRO Catalog

PRESERVE OUR HERITAGE: FAITH, FREEDOM and INCENTIVE

PULVERIZING MACHINERY COMPANY
39 Chatham Road Summit, New Jersey

MIKRO-PULVERIZER
MIKRO-ATOMIZER

Also Makers of the MIKRO-COLLECTOR

850,000 Copies of "Our Land" Distributed

—Photo by American Plant Food Council

"Our Land and its Care" is the center of the conversation between Dr. W. T. Spanton (left), chief, Agricultural Education Service, U. S. Office of Education and Paul T. Truitt, president of the American Plant Food Council. This 64-page illustrated booklet on our soil and how to keep it productive was prepared by the Council in collaboration with the Agricultural Education Service.

In presenting the 850,000th copy, Mr. Truitt stated that "we are pleased that this publication—issued in keeping with our support of sound agricultural education and research programs—has found a useful place in service to farmers, vocational teachers, county agents and others concerned with better soils as a means to better living". The presentation of the publication took place at a Washington luncheon given by the Council honoring the national officers of the Future Farmers of America and officials of the Agricultural Education Service.

Gill Heads Ammonia Group

E. H. Gill, Flint Steel Corp., Memphis, Tenn., was named president of the National Agricultural Ammonia Association at its recent meeting in Memphis. Other officers of the group included Virgil Rule, Greenville Liquid Fertilizer Co., Greenville, Miss., secretary; and Gen. Ralph W. Wooten, Mid-South Chemical Co., Memphis, treasurer. Mr. Gill succeeds Dr. W. B. Andrews, Mississippi State College.

•

SHADE TREES

(*Continued from Page 57*)

correct timing and the type of applicator used, as well as the right insecticide to employ.

In a discussion of "The Arborist's Job," Dr. Harlow B. Mills, chief of the Illinois Natural History Survey, Orbana, Ill., emphasized the need for more exploration of the "dark alleys of ignorance" still surrounding all phases of tree care.

We Suggest--
You Consider An Approved Clay Nearest Your Plant--Thereby Saving Money on Freight.

CLAYS

Especially Selected for Agricultural use at our Producing Plants Located in

NEW JERSEY MARYLAND
GEORGIA TENNESSEE
SOUTH CAROLINA

Full particulars regarding prices, carload & truckloads—together with carload freight charges to your plant gladly submitted.

UNITED CLAY MINES
CORPORATION
High Grade CLAYS of all kinds
TRENTON NEW JERSEY

Answers to the multitudes of unsettled questions, he said, can only be found through research, and this can best be done effectively and extensively by government. He suggested that the Midwest Shade Tree Conference assume leadership in promoting such governmental assistance.

"If we are to progress in knowledge," Dr. Mills concluded, "It is up to you. This is a social responsibility you cannot avoid. If you do not assume it, you have only yourselves to blame".

Placed also before the Chicago shade tree conference was a proposal that a special emergency committee of plant scientists be created to investigate the effects of atom bombs on trees and develop measures for treating tree disorders in the event of an enemy attack.

In the election of officers Alfred F. Carlstrom, superintendent of plantations of the Chicago Park District, was chosen president, Vance I. Shields, arborist, of Clayton, Mo., was made vice president, and Noel B. Wysong, chief forester of the Cook County Preserve District, Chicago, was continued as secretary-treasurer.

INSECTICIDES

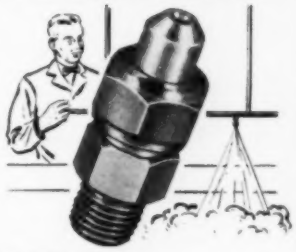
(*Continued from Page 34*)

are informed as to safe methods of handling and applying insecticidal materials.

A statement of the many factors involved in the commercial development of a new insecticide may be of interest to this group. What happens when an industrial laboratory finds a compound to be effective in its screening program? The first question is "How good is this find?" Careful laboratory and greenhouse tests must be made to see how it compares with standard products. If the new candidate still appears promising, sufficient amounts of the material must be made to conduct at least small scale field tests since the more severe conditions encountered in the field often bring out weak spots of a compound not noted in the laboratory. Lastly, large scale evaluation by independent state and federal investigators must be carried out before the new material can be logically recommended by the entomologlist for introductory sales. The entomologist is only one of many people interested in the development of this new product, however. Quite early in the developmental program, the toxicity of the new material should be determined; high toxicity may be a bar to proceeding with an otherwise effective chemical. Process studies must be initiated to explore possible methods of manufacture. Needless to say, the synthetic method used for the laboratory preparation of a chemical may not be at all adaptable for commercial production. If a decision is reached to proceed with the new product, manufacturing facilities must be made available, often requiring new construction. The steps just outlined in the development are both time-consuming and expensive—a period of several years and a research expenditure of several hundred thousand dollars can well be encountered between the synthesis of

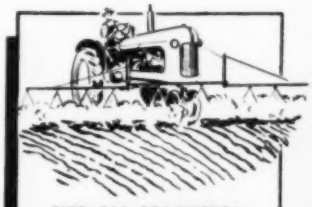
every Sprajet nozzle is hand tested!

Hand testing of every **Sprajet** Nozzle with a chemical solution is undertaken at our factory to predetermine proper spraying patterns under simulated field conditions. The thoroughness of this test enables us to UNCONDITIONALLY GUARANTEE **Sprajet** Nozzles for one full spraying season and assure users of efficient, trouble-free operation.



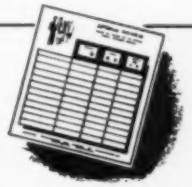
THERE IS A Sprajet NOZZLE FOR EVERY JOB

The full-size range of **Sprajet** tips, both flat fan and cone, assures users of a proper selection whether the job calls for spraying crops, pasture, live stock, brush or buldings. Today, **Sprajet's** complete line is filling the needs of the country's expanding spraying program.



FITS ALL SPRAYERS!

The universal interchangeability of SPRAJET parts and their increasing popularity as original equipment has made SPRAJET the only replacement line that need be carried today in order to service all makes of spray rigs.



Write For Free Sprajet Flo-Guide

For information on the chemical solution application per acre using SPRAJET nozzles at different speeds, pressures and row plantings, write for your free copy of our handy pocket-size Flo-Guide today.

Sprajet The Complete Replacement Line

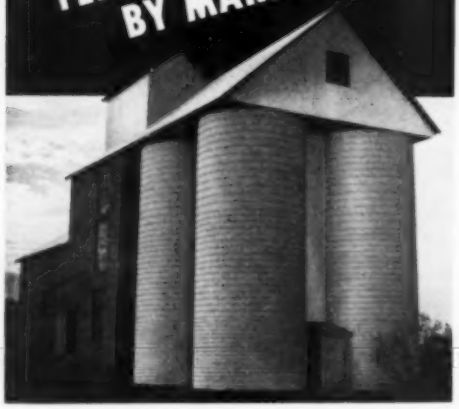
Nozzles—Suction Strainers—Line Strainers—Double and Single Swivel Nozzles—Thiokol Check Valves—Venturi Check Valves—Venturi Suction Valves.

ACCESSORIES MANUFACTURING COMPANY

705 McGee Kansas City 6, Missouri

dry Safe

FERTILIZER STORAGE BY MARIETTA



Here's a place where you can save *real* money and *real* worry, too. A MARIETTA-planned storage system costs no more initially and offers many exclusive long-run economies.

It is really SAFE. Aglite staves with hollow-wall construction keeps out moisture, heat, cold and other fertilizer and chemical enemies. The MARIETTA system will outlast any other. It should bring you an important reduction in insurance rates.

FREE ENGINEERING COUNSEL

MARIETTA Engineers who have designed hundreds of successful industrial storage systems will be glad to draw up a layout for your particular material handling and storage requirements. Before investing a dollar, you can see how the proposed system will shape up. No obligation, naturally.

Write for complete details.

THE MARIETTA CONCRETE CORP.

Marietta, Ohio

Baltimore, Md. Charlotte, N. C.

Your Insurance for *better* Crops!

CORONA

CORONA

- **ARSENATE OF LEAD**
- **MICRONIZED 50% WETTABLE DDT**
- **MICRONIZED WETTABLE and DUSTING SULFURS**
- **TREE WOUND DRESSING**
- **COROTHION** (15% Wettable Parathion)
- **CORONA "26"** (Tri-Basic Copper Sulphate)

CORONA
AGRICULTURAL DUSTS

Protect vegetable crops with finely ground, carefully formulated and blended dusts, embodying such well known ingredients as BHC, Calcium Arsenate, DDT, Parathion, Rotenone, Toxaphene, Tri-Basic Copper Sulfate, Sulfur, Carbamates (Coromate, Corozate, Dithane). Use Corona for best results.

See your dealer or write for full information about Corona's New Brush and Weed Control Chemicals.

Write for Literature

CORONA

PPG

Corona Chemical Division
PITTSBURGH PLATE GLASS COMPANY
MILWAUKEE, WIS. MOORESTOWN, N. J.

a new pesticide and the first return from the sale of the product.

Rodenticides

IT has been authoritatively estimated that the losses attributable to rodents in the U. S. amount to $200,000,000 annually. Rats are important from the standpoint of public health in addition to being prime destroyers of farm and industrial produce. While many mechanical devices have been suggested or used for rat control, chief reliance has been placed on chemical agents. The wary nature of rats has made them difficult pests to control.

The development of rodenticides has paralleled that of insecticides in that the last decade has witnessed the addition of several new, highly effective materials to the more unspectacular agents previously available. The chemicals used in largest amounts for rat control before the war were strychnine, phosphorus paste, zinc phosphide, thallium sulphate, barium carbonate, and red squill. The first four of these were so toxic to all forms of animal life as to make their use in rat control a hazardous procedure. Barium carbonate was not very satisfactory. Red squill, however, is still the material enjoying the largest volume of usage as a rodenticide. This material, which is obtained from the bulb of a liliaceous plant from the Mediterranean regions, is in many ways the ideal rodenticide, i.e., one that is effective against rats, but which offers little hazard to man or domestic animals. It has an objectionable taste and an emetic effect; those animals other than rats that will eat red squill promptly regurgitate it. Like practically all rat poisons, squill is applied in a variety of baits. Red squill is slow acting and unless standardized is apt to be quite variable in effectiveness. Rats obtaining sublethal doses become "bait-shy" and will not take the poisoned food again.

War-time shortages render the depredations of rats particularly severe. American research to find an effective chemical rodent control during the war resulted in the discovery of a-naphthylthiourea ("Antu") as an effective rat poison. It is considered safe for the inexperienced operator to handle and came into rather general use in most of the U. S. It is a specific for the brown rat, the most common species. However, it is also toxic to dogs and other carnivorous animals. Rats surviving sublethal doses build up a tolerance to the material.

"Castrix" (2-chloro-4-dimethylamino-6-methylpyimidine) is a German development which has not gained extensive use in this country.

Another highly effective rodenticide to appear from European research is sodium fluoroacetate (Compound "1080"). There is no doubt that this is the most potent rat-killing agent in use today; but it also is so exceedingly lethal to other warm-blooded animals that great caution is required in its use. Cats or dogs eating rats poisoned with the compound succumb rapidly. Only trained personnel are allowed to handle the product and permits are required for its use. It is commonly

MONARCH
WEED SPRAYS

NOTE THESE BIG FEATURES

1. Removable tip and strainer assembly. Unnecessary to disturb pipe connections for cleaning or changing sizes.
2. Round orifice no "feather" edges to wear away quickly.
3. Threaded strainer cannot jar loose from vibration.
4. Produce absolutely uniform spray from edge to edge — no "end jets" to cause uneven coverage.

MONARCH
MANUFACTURING WORKS, INC.
3406 MILLER ST. PHILA. 34, PA.
Exclusive Western Distributor: W. A. Westveto, Davis, Calif.

PYROPHYLLITE
Ideal As A
DILUENT
AND
CARRIER
FOR
INSECTICIDES
•
CAROLINA PYROPHYLLITE
COMPANY
10 EAST 40th ST. NEW YORK 16, N. Y.
Plants and Mines Located at
STALEY, N. C. and GLENDON, N. C.
Ask for Our Pamphlet

offered to rats in water solution. Nigrosine, a black dye, is added to the material to lessen the possibility of accidental ingestion.

An interesting new rodenticide now being marketed extensively is 3-(a-acetonylbenzyl)-4-hydroxycoumarin, which has been given the name warfarin. This compound is unusual as a rodenticide in that repeated feedings on successive days are required for effective action. Warfarin is an anticoagulant, preventing the formation of prothrombin. Painless death from internal hemmorrhage results after several days; no immediate symptoms are produced in the rat to cause "bait shyness". A disadvantage of warfarin is that it is slow in bringing a rodent population under control and that fairly large quantities of bait are required. Ingestion of sufficient warfarin would kill any mammal, but the low level of .025% used in rat bait minimizes the hazard. Swine seem especially sensitive to poisoning by warfarin. ★★

SUPPLIERS BULLETINS

(*Continued from Page 93*)

new bulletin, "Pennsalt No. 201", gives in tabulated form for quick reference and ease in following directions a list of the host trees, the insect pest causing damage, the amount of spray to be used and special instructions on how it should be applied.

The booklet is available from the agricultural chemicals department, Pennsalt Chemicals, 1000 Widener Building, Philadelphia 7, Pa.

•

Control Officials Report

Information covering the 1950 meeting of the Association of Economic Poisons Control Officials is contained in the Association's official report recently published. The regulatory principles and definitions of terms adopted at the October meeting are published, as are the roster of officers, committees, investigators, suggested sampling procedure, uniform bill, application for registration forms, certificate of registration and the Association's constitution and by-laws.

Copies of papers presented at the meeting are also included, along with a complete list of those registered at the meeting. Officers of the A.E.P.C.O. are: Allan B. Lemmon, chief of the California State Bureau of Chemistry, Sacramento, president; Dr. E. W. Constable, Raleigh, N. Carolina, vice-president; and Dr. A. B. Heagy, College Park, Md., secretary-treasurer.

•

Weed Control in Flax

"How to Maintain Flax Yields in Dry Years" is the title of a booklet issued recently by the Flax Development Committee of the Flax Institute of the U.S., 524 Roanoke Bldg., Minneapolis, Minn. The booklet, printed in two colors, presents information on weed control, ideas on how to preserve moisture, and other tips for use of chemicals in flax production. Copies of the booklet are availalble from the Institute.

HOW HLW EMULGATES stretch short supplies of essential insecticides and fungicides

1 **HLW EMULGATES,** at a 20% concentration in well tolerated glyceride oils, produce emulsion sprays as effective as the *more highly* concentrated wettable powders or solvent solutions.

2 **HLW EMULGATES,** at a 1% to 2% emulsion, assure complete coverage—longer residual action—good plant tolerance.

3 **HLW EMULGATES,** in the form of a *single* all-purpose concentrate, combining different insecticides and fungicides, save costs and time . . . and serve a wider market.

4 **HLW EMULGATES,** with organic copper and mercury dissolved in glyceride oils, protect against a wide range of fungus diseases and are sprayed from blossoming time far into the season. Through better absorption and penetration, they have curative value without phytotoxicity.

5 **HLW EMULGATES,** are the economical emulsion concentrates for high pressure, mist and air blast equipment.

All inquiries will be answered promptly.

HLW H. L. WOUDHUYSEN & ASSOCIATES DIGBY 4-1857

Factory at Long Branch, N. J. 17 BATTERY PLACE • NEW YORK 4, N. Y.

AGRONOMISTS

(Continued from Page 89)

need for more research to find answers to many still unsolved problems.

Prof. Burson also commented on the demand for increased production of cereal and oil crops to meet the national emergency. This, he said, has greatly retarded the use

TABLE I

Minimum Fertilizer Grades.* Agronomists' Recommendations for Year Beginning July 1, 1951

Ratio	Ohio	Ind.	Ill.	Mich.	Wis.	Minn.	Iowa	Mo.	Ky.	Kans.	Nebr.	S. Dak.	N. Dak.
0-1-3	0-9-27	0-9-27	0-9-27	0-9-27	0-9-27	0-9-27	0-9-27	0-9-27					
0-1-2	0-10-20	0-10-20		0-10-20		0-10-20		0-10-20	0-10-20				
0-1-1	0-12-12	0-12-12	0-20-20	0-12-12	0-20-20	0-20-20	0-20-20	0-20-20	0-12-12	0-20-20			
0-2-1	0-20-10	0-20-10	0-20-10	0-20-10	0-20-10	0-20-10	0-20-10	0-20-10	0-14-7	0-20-20			0-20-10
1-8-4				2-16-8									
1-6-3				3-18-9				4-24-12					
1-4-4	3-12-12	3-12-12	3-12-12	3-12-12	3-12-12	3-12-12	3-12-12	3-12-12	3-12-12	4-24-12	4-24-12	4-24-12	4-24-12
1-4-2	4-16-8	4-16-8		4-16-8	4-16-8	4-16-8	4-16-8	4-16-8	4-16-8				
1-3-9			3-9-27		3-9-18	3-9-18	3-9-18	3-9-18					
1-3-6	3-9-18	3-9-18		3-9-18	4-12-8	5-15-10		4-12-8	4-12-8				
1-3-2	4-12-8		4-12-8	4-12-8				8-24-8		8-24-8			
1-3-1									4-8-12				
1-2-1						6-12-12	6-12-12		5-10-10				
1-2-2	5-10-10	5-10-10					10-20-10		5-10-5		10-20-10		10-20-10
1-2-1					6-6-18								
1-1-3					10-10-10	10-10-10	10-10-10	10-10-10					
1-1-1	8-8-8	8-8-8	10-10-10	8-8-8		6-24-0	6-24-0			6-24-0	6-24-0	6-24-0	6-24-0
1-4-0							13-39-0	13-39-0		13-39-0	13-39-0	13-39-0	13-39-0
1-3-0						10-20-0	10-20-0	10-20-0		10-20-0	10-20-0	10-20-0	10-20-0
1-2-0						20-20-0	20-20-0	20-20-0		20-20-0	20-20-0	20-20-0	20-20-0
2-1-1	12-6-6	12-6-6		12-6-6					12-6-6				
3-4-4									6-8-8				

* The production of higher grades of the recommended ratios is encouraged. It is also recommended that the supply of straight nitrogen, phosphorus, and potassium material be increased.

FOR "high-nitrogen" FERTILIZER—use Koppers Ammonium Sulphate!

● Koppers offers a good commercial grade of ammonium sulphate—the element that is so essential to fertilizer because of its high nitrogen content.

KOPPERS

KOPPERS COMPANY, INC.
Tar Products Division
Pittsburgh 19, Pa.

Characteristics

Koppers Ammonium Sulphate comes in crystals with low free-acid and moisture content. The nitrogen content is guaranteed to be not less than 20.5%.

Shipment

From St. Paul, Minn. and Kearny, N. J., Koppers Ammonium Sulphate is shipped in 100 lb. and 200 lb. bags—also in boxcars and trucks. From Granite City, Ill. and Midland, Pa., it is shipped only in boxcars and trucks.

by farmers of more pasture and meadow crops.

"Pastures are Crops," Too

PASTURES and meadows, he insisted, are crops, the same as grain or corn, and, as crops, they respond to good management and proper soil treatment. He emphasized that a good pasture and meadow program is the best insurance against the menace of soil erosion. A well managed program, he said, will improve the soil, increase productivity, stabilize production and, over a period of years, will improve the farm income and family living.

Following the practice of many years' standing, the state college agronomists released to the manufacturers during the Chicago meeting their recommended "minimum fertilizer grades and ratios" for the year beginning July 1, 1951 for use in the thirteen states in which the Midwest Soil Improvement Committee is interested. (See table on page 115).

Another subject brought up was the matter of nomenclature changes to express the content of fertilizer on the elemental basis. A resolution formulated by the agronomists at their earlier meeting urged "that consideration be given the matter of expressing the content of nutrient elements in fertilizer, including the minor elements, on an elemental basis".

Serving as chairman of the Chicago conference between the manufacturers and agronomists was Dr. G. W. Volk of Ohio State University. Active also throughout the day in promoting the smooth running of the program were the midwest committee's officers, including its president, B. C. Manker, president of the Michigan Fertilizer Co., Lansing, Mich., and Diamond Fertilizer Co., Sandusky, O.; its vice president, J. D. Stewart, Jr., of Federal Chemical Co., Louisville, Ky.; its treasurer, W. B. Copeland, of Smith-Douglas Co., Streator, Ill. and the organization's executive secretary, Z. H. Beers, of the Chicago headquarters office.

•

Appoints Griffin Agent

West Coast Chemicals and Solvents Corporation has appointed Griffin Chemical Company, San Francisco, exclusive Northern California sales representatives for all products manufactured by their subsidiary, Lac Chemicals, Inc., Culver City, California. The appointment was announced by K. R. Simpson, Jr., president of the parent company, as a step in the development of Lac's facilities for Western distribution in keeping pace with industrial expansion on the West Coast.

Please!

help us to serve you and all other users

of PYRAX ABB by

PLACING YOUR ORDERS NOW

PYRAX ABB

is the Pyrophyllite most widely used as a carrier for insecticides and fungicides.

Last summer we filled the flood of orders for PYRAX ABB *on time,* but only by delaying production of non-agricultural grades and increasing agricultural production to peak plant capacity.

You can help us to help you if you

ORDER NOW

R. T. VANDERBILT CO., Inc.
SPECIALTIES DEPARTMENT
230 PARK AVENUE NEW YORK 17, N. Y.

FUNGICIDE TESTS

(*Continued from Page 65*)

results and the results fall into the same pattern of control afforded by various materials used in 1949.

These experiments were conducted in the presence of far more disease than is ordinarily encountered during the regular tomato transplant growing season.

The results indicate that under even extremely severe conditions there

are available to the tomato plant grower several fungicidal materials which will give a relatively high degree of control of Alternaria blight. In all cases disease control was much better from the fungicides in *spray* form, as compared with the same materials in dust form.

A point to be emphasized is that of the four best spray materials, namely nabam ("Dithane D-14") plus zinc sulfate and lime, ziram ("Zerlate"), zineb ("Dithane Z-78"), and tribasic copper sulfate, two, i. e., nabam plus zinc sulfate and lime, and zineb, have also been reported to afford a high degree of control not only of late blight, caused by the fungus *Phytophthora infestans*, but also of gray leaf spot, caused by the fungus *Stemphylium solani*. In the Georgia plant-growing area, late blight has so far appeared only at intervals, and gray leaf spot is as yet rare. Nevertheless, both these disease constitute an everpresent threat to the plant grower, and when they do appear the damage may be sudden and extensive. For this reason, a fungicide is required that will protect the plants from these diseases as well as from Alternaria blight.

BHC-DDT BLENDING

(*Continued from Page 60*)

relatively small change of specific gravity with temperature. For example, it was determined that a specific composition weighed 12.71 lbs. per gallon at 170°F. and 13.12 lbs. per gallon when supercooled to 80°F. For rapid measurement, this offers a means more accurate than weighing, less susceptible to human errors and at the same time, advantageous to high production.

In actual practice as a matter of economics, a dust concentrate is first prepared and subsequently diluted to a finished dust, typically 3-5-0. A quantity of 36% gamma BHC is melted in a suitable vessel equipped with a steam coil or jacket, after which the requisite amount of DDT is added. The time required for complete solution of the DDT is obviously dependent upon the specific design of melting equipment, temperature, and manner of agitation. At temperatures ranging from 140° to 160°F. the time required for solution of 3-inch to 5-inch lumps in the requisite quantity of BHC varied between 1.4 and 0.67 minutes per lb. of DDT with mild stirring. To produce a finished dust containing 3 parts of gamma per 5 parts of DDT from 36% technical BHC, it is necessary to use 8-⅓ parts of the technical BHC per 5 parts of DDT. Thus the molten mix will contain 62-½% BHC and 37-½% DDT. Commonly, an absorptive carrier is impregnated with a quantity of this melt sufficient to make a 9% gamma BHC-15% DDT concentrate, although it is possible to impregnate as high as 12% gamma BHC-20% DDT. This latter composition is probably the upper limit. The concentrate is then blended with three or four times its weight (as the case may be) of non-absorbent extender for 3-5-0 or sulfur and extender for 3-5-40.

The ease of melting and the ability to supercool offer obvious ad-

Announcing

DPM *a new WATER SOLUBLE phenyl mercuric acetate . . .*

for COMPOUNDERS, REPACKAGERS

Furnished as a granular powder in concentrated form, DPM offers these advantages over liquid mercury complexes:

FASTER-ACTING...MORE LASTING EFFECT...EASIER TO USE

EASIER TO HANDLE AND SHIP... GREATER UTILITY

SUGGESTED USES:

*** Crabgrass Control**

1. Apply as a solution with watering can. (Two applications give complete control).
   or
2. Apply with sprayer.
   or
3. Mix with diluent such as sand, vermiculite, etc. and apply dry.
   or
4. Mix with certain fertilizers and apply in Spring to PREVENT CRABGRASS EMERGENCE.

*** Apple Scab Control**

1. In powder form easy to package.
2. Cannot freeze.
3. Stable indefinitely.
4. Inexpensive.
5. 1950 field tests proved DPM equal to any mercury formulation.

*** Seed Disinfectant**

1. Use as a powder.
2. Use as a solution.
3. Use as a slurry.

*** Agricultural Weed Control**

1. Mix with 2,4-D. Excellent control of weeds and crabgrass in gladiolus and certain other bulb crops.
2. Apply as pre-emergence treatment for weed-row crop control for many crops. Neutralize 2,4-D residue with activated carbon. Synergistic action of mixture requires less 2,4-D, thus neutralizer is reduced to under 10 lbs. per acre on 3 ft. row crops, band treated.

Also available as a 10% solution

Investigate this interesting material for a possible addition to your 1951 line!

Details and Samples on Request

(Specify type of test for which you require samples)

O. E. LINCK CO. INC. Dept. 10 CLIFTON, N. J.

vantages and economics in processing. Necessity of grinding the technical chemicals is eliminated and in addition, the quality of the resultant dust is of high order because the toxicant mixture of BHC and DDT does not solidify or set up at once but remains sufficiently fluid to permeate entirely the whole mass of the absorbent carrier. The result is an impregnated dust of fine physical characteristics and a high degree of efficacy. Furthermore, the finished products contain substantially less of the other isomers of BHC than similar formulations prepared from a crude 12 to 15% gamma isomer BHC.

The equipment for applying this processing technique need not be complex and many impregnating and blending systems now in use can be readily adapted to this process, perhaps with minor changes. In this case, the solid materials are preweighed and charged to the agitated vessel and melted. The resultant liquid is then pumped to the measuring tank until the scale beam balances at a predetermined setting. This same pump is utilized for spraying the melt into the impregnating mixer.

Application of the foregoing principle in the manufacture of BHC-DDT dusts by direct impregnation represents another step forward in agricultural chemical technology. The method is relatively simple and economical. The resultant dusts are uniform, possess desirable physical characteristics, and are highly effective.

Go the scientific way...go **MGK**

AEROSOL INSECTICIDE CONCENTRATES

SPRAY INSECTICIDE CONCENTRATES

DUST INSECTICIDE CONCENTRATES

You may want complete formulas . . . ready to put right into your aerosol bombs or your retail packages. You may want combinations of insecticides and synergists that leave you only the minimum of processing to do. You may want to do most of the processing yourself and to you we offer the purest toxicants and synergists in their primary forms. MGK has the *best* of whatever you want. The emblem "MGK" is satisfying assurance of high efficiency and scientific production in insecticides and insecticide ingredients. Let this single experienced source help you make better products for less money. For complete information about MGK prices write 1703 Southeast Fifth St., Minneapolis, Minn.

Scarabaeus sacer
Sacred beetle of ancient Egypt. Model for carved stone amulets and scarabs.

THE PIONEERS OF PYRETHRUM AND ALLETHRIN

Good insecticides protect America's health and harvest.

McLAUGHLIN GORMLEY KING COMPANY

FRUIT FUNGICIDES

(*Continued from Page 37*)

timate value has not been determined.

Actidione, an antibiotic substance with cycloheximide structure, is being tested for the control of a number of plant diseases. It seem to be very effective against certain species of mildew but unfortunately proved both ineffective and phytotoxic in tests for control of apple mildew in the States of Washington and Maryland. Actidione has been reported to have an eradicative action on the cherry leaf spot fungus but it injured peaches when tested for its effect on the brown rot fungus. Streptomycin, another antibiotic substance, has been reported to kill the bacterial spot organism in infected plum buds.

Another promising field is the control of diseases by internal treatment by injecting the chemicals either directly into the plants or into the surrounding soil from which they may be absorbed by the roots. Living peach trees are reported to be immunized in the greenhouse against artificial infection by the X-disease virus by injections or by watering the trees with aqueous solutions of such chemicals as calcium chloride, 8-hydroxyquinoline sulfate, or p-aminobenzene sulfonamide and by extracts of the leaves and twigs of *Prunus serotina*, a wild species not susceptible to X-disease.

Preliminary experiments have been carried on recently with a combined fertilizer-fungicide spray. Urea has been added to ferbam, sulfur, and bentonite sulfur. Some reports indi-

cate an increase in the effectiveness of the fungicide component against the apple scab fungus. Other reports indicate the nitrogen may stimulate the leaves and render them more susceptible to infection with the scab fungus.

Summary

INORGANIC copper compounds, generally efficient fungicides, are apt to produce serious injury to the host plants. Sulfur, another material used for many years, is less phytotoxic except in the form of calcium polysulfides and will probably be the standard material to use on peaches for many years to come. Zinc, while not used as extensively as copper and sulfur, has not proved very efficient when used as the major constituent of the zinc-lime spray for bacterial spot control. The planting of numerous susceptible peach varieties in recent years has accentuated this weakness.

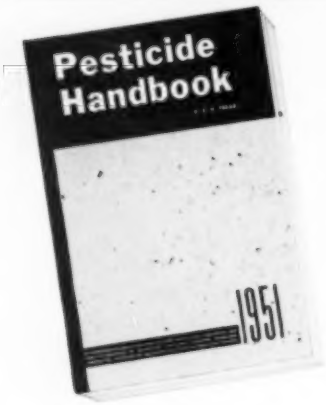
In view of the shortcomings of these standard materials it is not surprising that the plant pathologists have turned to the organic chemist for more efficient and less phytotoxic compounds.

The investigations carried on since 1935 with new materials have not solved all the problems but we feel that definite progress has been made.

The problem of injury from copper ions has been reduced by using other less phytotoxic materials. The specificity of certain compounds has given a degree of control formerly considered impossible. The organic mercury preparations with their high eradicative efficiency suggest the possibility of eliminating early in the season the primary infections of the apple scab fungus. The plant pathologist is now better equipped to combat new diseases or old diseases on new hosts. The recent development in Georgia of the peach anthracnose problem is an excellent example. This disease, caused by the apple bitter rot fungus, would have presented an impossible situation if bordeaux mixture were the only material available for its control on peach. The disease still presents a problem, but with zinc dithiocarbamates and 2,3 dichloro 1,4 naphthoquinone available, control can be developed without the risk of serious injury to the trees such as would have occurred if only copper compounds were available.

These are but a few examples of the progress made. We have just started to explore the almost countless number of organic compounds. We especially need compounds that are good bactericides and others to destroy or inactivate the various virus entities attacking fruit plants.

There are numerous problems still unsolved but we feel that continued cooperative research by chemists and plant pathologists will bring promising rewards. We have yet to produce disease-free fruit crops, but who knows what the yield of our orchards will be if we succeed in reducing to a minimum the ravages of the various parasites which infect them?



an important book for those interested in any phase of

PEST CONTROL

County agents, extension and research specialists, manufacturers, salesmen, jobbers, dealers, purchasing agents, health officers, farmers and librarians have found this publication to be extremely useful time and time again. *Pesticide Handbook* is the ONLY book giving complete up-to-the-minute information on nearly 4,000 commercial products, completely indexed by trade names, active ingredients and manufacturers.

at your fingertips—

You'll find a wealth of information on fungicides, insecticides, rodenticides, adjuvants, diluents, compatibilities, antidotes, and pest control equipment.

about the editor—

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1951, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition, he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides". Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State College.

Nearly 200 Pages **1.00** Plus 10¢ per copy for mailing costs

Send Today

PESTICIDE HANDBOOK

P. O. Box 798

State College, Pennsylvania

PESTICIDE USE

(*Continued from Page 47*)

States exports of organic pesticides to that area rose from practically nil in 1939 to $131,000 in 1949 and to $212,000 in January-June 1950.

Japan — Occupation authorities are promoting use of pesticides for increasing crops and for protection of harvested cereals, as well as for malaria control, and use in Japan has risen greatly since the end of World War II. In 1949, 792 metric tons of DDT concentrates were produced, three times as much as in 1948. This amount supplies domestic requirements and allows for exports. BHC is manufactured, 1949 output totaled 595 tons, 19 percent above that planned. U. S. exports of organic pesticides to Japan rose from $126,000 in 1939 to $821,000 in 1949, when they consisted almost entirely of nicotine sulfate and miscellaneous agricultural insecticides.

New Zealand—In 1939 imports of pest control chemicals into New Zealand totaled $625,000, principally sheep dip from the U. K. Estimated 1950 imports were about 40 long tons of organic products, with the U. K. and Australia as the principal suppliers. However, U. S. exports of organic pesticides to New Zealand rose from $38,000 in 1939 to $316,000 in 1949.

Palestine — Prior to World War II consumption of pesticides ran about 800 metric tons a year; 680 tons were inorganic materials. However, in recent years additional quantities of organic materials have been employed. An indication of the trend in this direction is a change in the tariff schedule on June 8, 1950, making entry of all organic pest control chemicals duty-free, while inorganic materials remain at 15 percent ad valorem. U. S. exports of organic pesticides to Palestine rose from $22,000 in 1939 to $199,000 in 1949; inorganic materials exported to Palestine were nil.

Philippine Republic — These islands are turning more and more to organic pest control chemicals, with the U. S. as the principal supplier. U. S. exports of organic pesticides to these islands rose from $55,000 in 1939 to $381,000 in 1949, with that level continuing in the first half of 1950.

Thailand—Thailand Government departments are testing various new organic pest control chemicals and use is increasing, particularly for protection of the rice crop. It is reported that the Ministry of Public Health will require approximately 100 metric tons of organic commodities for its 1950 anti-malaria campaign. U. S. exports of organic pesticides to Thailand rose from $6,000 in 1939 to $147,000 in 1949, but the rate in the first half of 1950 was somewhat lower.

Africa

ALTHOUGH this continent is largely undeveloped and the general populace is not aware of the benefits of pest control, use of insecticides has increased in recent years. U. S. exports of these products to that continent rose from $360,000 in 1939 to almost $2,000,000 in 1949. In 1949, $1,610,000 consisted of organic materials against $367,000 of inorganic, practically all of which was copper sulfate to Algeria. British East Africa and the Belgian Congo are the major world suppliers of pyrethrum flowers.

The Union of South Africa produces sizable amounts of various organic pest control products and exports important quantities to neighboring countries. However, despite domestic production, the Union is the largest African market for U. S. exports of specialties in the pest control field, shipments having increased from $212,000 in 1939 to $738,000 in 1949. Other countries are destinations for rather large amounts, but Algeria, Belgian Congo, and Egypt are the principal markets, and show greatest increase the past 10 years.

Conclusion

AVAILABLE information on world production and consumption of pest control materials and data on exports from the U. S.—the major supplier— clearly indicate that recent scientific and technological developments have resulted in a decided

trend toward greater use of organic pesticides. Over-all use of insecticides and related materials has risen sharply but percentage wise 1949 consumption of organics was considerably above that of the inorganics, a direct reversal of the situation 10 years ago. Also, based on demand for exports from the U. S. in January-June 1950, this trend is continuing and it is believed that in the years to come use of synthetic organic compounds will far outrank that of inorganics, with the probable exception of copper sulfate in Central America.★★

AMMONIA & PRICES

(*Continued from Page 51*)

The practical limit has largely been reached in the proportion of free ammonia that can be used in making mixed fertilizers. The use as a separate material for direct application, however, has grown very rapidly in the past few years. The latter use is apt to continue to grow if ammonia remains relatively inexpensive.

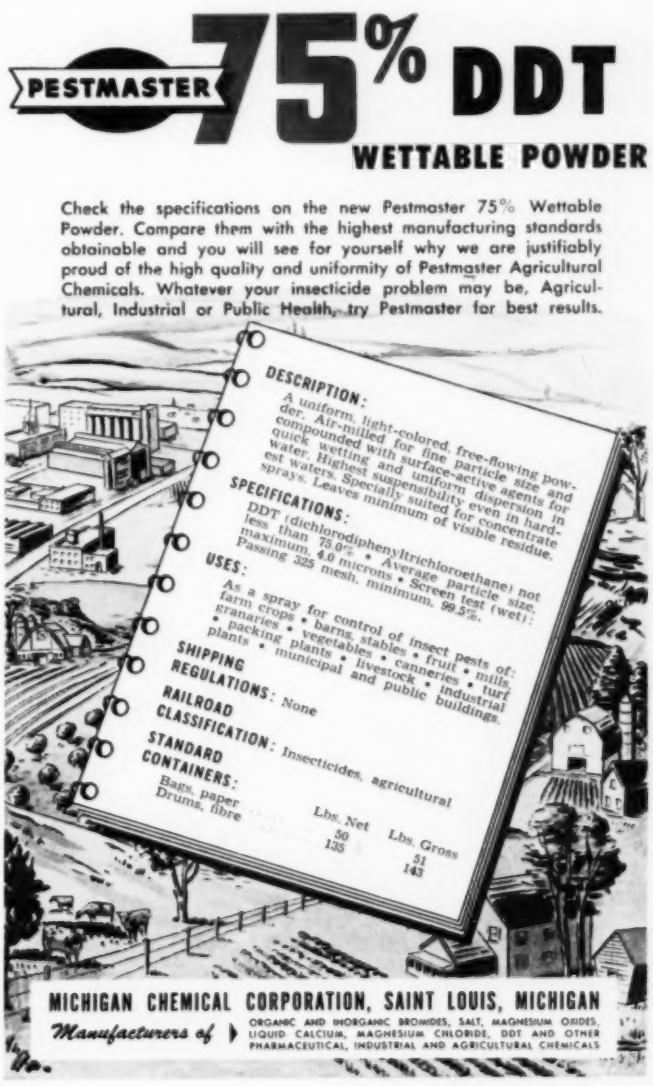
Summary

THE history of fertilizer nitrogen prices in the United States is briefly outlined. It is shown that changes in price relationships for different forms have been quickly followed by changes in usage in manufacturing mixed fertilizers.

At present anhydrous ammonia is the cheapest source of nitrogen. In 1947 50.8 percent of all the nitrogen in mixed fertilizers was derived from ammonia or liquors containing free ammonia. In 1949, 170,000 tons of free ammonia was used in making mixed fertilizers and 69,000 tons was used directly in agriculture. Ammoniating liquors, ammonium sulfate and ammonium nitrate together provide about 90 percent of all the nitrogen in commercial mixed fertilizers.

The delivered cost of nitrogen in liquid, ammonium sulfate and ammonium nitrate forms is given for a period of years at a number of important fertilizer producing centers throughout the United States. Of these three forms, liquid nitrogen has been the lowest cost at all points studied since 1940. In some years prior to 1940, nitrogen was bought delivered at certain points near by-product coken ovens for less than the cost of liquid nitrogen. Of the 2 solids considered here, the nitrate is the lowest cost form at some points and the sulfate at others. At some points last year it was profitable to ammoniate superphosphate very heavily in spite of revision of available P_2O_5.

When phosphate that cannot absorb free ammonia, such as calcium metaphosphate or fused phosphates, are used in making mixed fertilizers, they are relatively much more expensive, even at the same delivered cost per unit of P_2O_5, because of the necessity of using higher-priced forms of nitrogen.


PESTMASTER
75% DDT
WETTABLE POWDER
Check the specifications on the new Pestmaster 75% Wettable Powder. Compare them with the highest manufacturing standards obtainable and you will see for yourself why we are justifiably proud of the high quality and uniformity of Pestmaster Agricultural Chemicals. Whatever your insecticide problem may be, Agricultural, Industrial or Public Health, try Pestmaster for best results.
DESCRIPTION:
A uniform, light-colored, free-flowing powder. Air-milled for fine particle size and compounded with surface-active agents for quick wetting and uniform dispersion in water. Highest suspensibility even in hardest waters. Specially suited for concentrate sprays. Leaves minimum of visible residue.
SPECIFICATIONS:
DDT (dichlorodiphenyltrichloroethane) not less than 75.0% • Average particle size, maximum, 4.0 microns • Screen test (wet): Passing 325 mesh, minimum, 99.5%.
USES:
As a spray for control of insect pests of: farm crops • barns, stables • fruit • mills, granaries • vegetables • canneries • turf • packing plants • livestock • industrial plants • municipal and public buildings.
SHIPPING REGULATIONS: None
RAILROAD CLASSIFICATION: Insecticides, agricultural
STANDARD CONTAINERS:
Bags, paper — Lbs. Net 50 — Lbs. Gross 51
Drums, fibre — Lbs. Net 135 — Lbs. Gross 143
MICHIGAN CHEMICAL CORPORATION, SAINT LOUIS, MICHIGAN
Manufacturers of
ORGANIC AND INORGANIC BROMIDES, SALT, MAGNESIUM OXIDES, LIQUID CALCIUM, MAGNESIUM CHLORIDE, DDT AND OTHER PHARMACEUTICAL, INDUSTRIAL AND AGRICULTURAL CHEMICALS

2,4-D TREE INJURY

(*Continued from Page 43*)

The extent of vapor drift injury depends upon a number of factors, among which are the amounts of 2,4-D applied in a given area and the direction of air currents in relation to sensitive plants. At times, it may appear that these forms of 2,4-D are perfectly safe. At other times, an appalling amount of distortion may be caused. One observer has reported typical distortion to cotton a mile from a right-of-way to which hormone sprays were being applied. Effects of such sprays have been observed a thousand feet in all directions, uphill and downhill, from a transmission line sprayed along a mountainside.

In one case, so many trees in a small midwestern city showed definite symptoms of 2,4-D injury that a survey was made to determine the frequency and forms of the chemical used together with locations in relation to the symptoms shown by trees. Careful diagnosis, elimination of other possible causes and repeated cross checking of the factors involved, established the prevalence of 2,4-D damage throughout most of the city. In some locations, where it was established that only the volatile form of 2,4-D had been employed, injury was easily and definitely identified alongside the places being treated. Black locust trees three inches in diameter have been killed because a sprayer dripping with ester solution had been parked on the road below the bank on which the trees grew!

It should be emphasized that vapor drift injury to trees may occur from use of volatile forms of both 2,4-D or 2,4,5-T applied during mid-winter when the trees are dormant. The symptoms of course are visible only after growth begins in the spring, but every operator should bear in mind that such damage might occur when treating with these chemicals for control of dormant brush or for killing freshly cut stumps along rights-of-way.

The third way in which 2,4-D may come in contact with trees with resulting bad effects, is through the soil. Several technical observers have reported on this phase of the problem, indicating that damage to trees from this chemical absorbed through the roots is more common than was known previously. This form of injury is most likely to occur from over-use, or too-frequent use of 2,4-D, making it necessary to guard against this type of injury.

Symptoms in Trees

TREES exposed to harmful concentrations of 2,4-D show a variety of symptoms of injury. These are not always the same, even on a given species of tree. The symptoms may not always be the same on trees injured from vapor drift and on other trees of the same kind which have absorbed the toxicants via the roots. In severity, the damage may range from browning and death of all the parts of a tree, to such vague

Better Protection... Better Yields
100 LBS. NET WEIGHT
PHELPS DODGE REFINING CORPORATION
TRIANGLE BRAND
BASIC COPPER SULPHATE
For BETTER and SAFE Control of
BLIGHT
TRIANGLE BRAND
COPPER SULPHATE
Triangle Brand Copper Sulphate is dependable . . . safe and costs less. Yet, by actual field test, it gives greater yields! That's why growers actually use more Triangle Brand Copper products on their crops than any similar plant protection material. Don't be satisfied with "substitutes." Get the best—always demand Triangle Brand.
FREE!
Valuable booklets: "Bordeaux Mixture," "Bordeaux Controls Late Blight of Tomatoes," "Better Potato Yields," "Basic Copper Sulphate."
PHELPS DODGE REFINING CORPORATION
40 Wall Street, New York 5, N. Y.
230 N. Michigan Ave., Chicago 1, Ill.

distortion that it is noticeable only on close observation. In the case of severe injury from vapor drift, there is usually a tapering off of symptoms as the distance increases from the spot where the spray was actually applied.

Generally, injured trees or twigs show a distortion due to uneven growth which takes place following exposure to the chemical. This distortion takes many forms. Leaves may roll upward or downward, at the midrib or along the edges, to form a boat-shaped or cupped distortion. Leaf stems may curl downward or even form loops resembling "pigtails". From a distance, a tree with all the leaf stems affected in this manner, may appear to have wilted, although this is not the case. Badly distorted leaves are usually thick and leathery in both their appearance and their texture. The tissues usually appear to be turgid, just the opposite of leaves wilting or about to wilt. Rapidly-growing twigs also bend into weird forms. Distortion is most pronounced if the injury occurs during, or previous to, a period of rapid growth. Some leaves grow so much more narrow than normal, that they are sometimes said to appear filiform or "threadlike" in appearance.

Ash leaflets, for instance, have been observed to make one complete corkscrew turn from base to apex. Elms, which are among the very sensitive species of shade trees, frequently show a downward cupping at the ends of the leaves. One can often remove such a leaf and by inserting the end of a finger in the cup at the end, hang the leaf from the finger. Where injury is severe, leaves are generally undersized, and ends of the twigs may die with no recovery in the same season. This has been noted especially on elms which have taken in 2,4-D by the roots, although the same thing has been noted in other species badly injured from vapor drift in brush control experiments. If injury has occurred early in the growing season and was not severe, more nearly normal leaf growth often takes place on the same twigs later in the summer. Injured leaves sometimes are yellow or chlorotic in appearance.

Direct application of 2,4-D such as takes place in brush spraying, or such as could happen from bad spray drift, may result in serious and fairly prompt browning of the leaves and tender twigs followed by death of a part or all of the stems, and, in some cases, death of the entire plant. Sometimes the above-ground parts of the stem are apparently killed, followed by slow or rapid regrowth coming out through the bark. All of the leaves drop, but the sprouts make good recovery.

Diagnosis of Injury

DIAGNOSIS is not always easy to make, since there is a considerable amount of variation in symptoms, depending upon the cause of injury. Distortion from direct spray drift or vapor drift will show up rather soon after exposure, and the response may be more noticeable in the spring or on rapidly growing plants than it is later, on more mature growth. This is not always the case, however. Experiments with an ester of 2,4-D along a right-of-way some

COPPER SULPHATE

Crystals - Superfine - Powdered

BASIC COPPER SULPHATE

●

ZEE-N-O

(Neutral Zinc)

The High Test Nutritional Basic Zinc

56% Zinc as Metallic

●

MANGANO

(Neutral Manganese)

The High Test Nutritional Manganese

55% Mn as Metallic

●

W. R. E. ANDREWS SALES, INC.

1505 Race Street, Philadelphia 2, Pa.

Since 1926

Agricultural Chemicals Specialists

Heckathorn AND COMPANY

COMPLETE WEST COAST CHEMICAL SERVICE

Warehousing • Complete 2,4-D Processing Equipment

Custom Grinding (micro-fine) • Mixing and Filling of Liquids (tank cars to pints) • Grinding and Packaging of Powders (carloads to ounces)

HECKATHORN & CO.

641 S. Fourth Street
Richmond, California

FOR AGRICULTURAL SPRAYING

SPRAYING SYSTEMS
TeeJet
SPRAY NOZZLES

Interchangeable Orifice Tips . . . flat spray, cone spray, and disc-type cone spray. Full range of sizes for every spraying need.

Do you have complete information on Spraying Systems TeeJet Spray Nozzles and accessories? TeeJet Spray Nozzles are built in every type and capacity for farm spraying. Related Products include strainers, connectors, and valves for better operation of spray booms and portable sprayers. Bulletin 58 gives all details . . . sent free upon request.

SPRAYING SYSTEMS CO.
Engineers and Manufacturers
3230 RANDOLPH STREET • BELLWOOD, ILLINOIS

WRITE FOR TeeJet BULLETIN 58 . . . HAVE ALL THE FACTS

ISCO AGRICULTURAL CHEMICALS ISCO

SOIL FUMIGANTS
LARVACIDE—(chlorpicrin) for soil treatment.
ISCOBROME—toxicant methyl bromide.
ISCOBROME D—toxicant ethylene dibromide.
ISCOBROME D42

INDUSTRIAL FUMIGANTS & SPRAYS
LARVACIDE
LARVABROME—chlorpicrin & methyl bromide.
METHYL BROMIDE
ISCOSPRAY & SERVACIDE SPRAY—toxicant pyrethrins & piperonyl butoxide oil base.

ISCOMIST AEROSOL BOMBS
for industrial & greenhouse use—also pre-mix for bulk users.

DEER & RABBIT REPELLENTS
GOODRITE NO-NIB'L & Z.I.P.

OTHER SPECIALTIES
WEEDNIX—selective contact herbicide.
PLANTEX—anti-transpirant.
VISQUEEN—plastic soil cover.

Write for Distributor Proposition on These Profit-Making ISCO Items!

INNIS, SPEIDEN & CO.
117 Liberty Street, New York 6, N. Y.

ATTENTION DUST MIXERS!

We are now offering complete, integrated blending and impregnation systems for handling practically all basic chemicals in formulating concentrates and finished dusts. Contact our engineers for details.

THE YOUNG MACHINERY COMPANY
MUNCY PENNSYLVANIA

time ago, caused almost every leaf to die on all of the sassafras trees and grape vines within 250 feet of the power line. This took place within a few days after the spray was applied. This action is to be contrasted with the slowness exhibited when injury through root absorption may not show up seriously until the next season after the application was made to a lawn. There are other variations, too. While injury from drift usually tapers off as the distance from the point of application increases, exceptions are noted to this rule. Trees near the place where the herbicide is being sprayed may be resistant to the chemical's action, while those some distance away may be susceptible. Thus, those a greater distance away receive greater injury. Cases have been noted where resistant trees nearby showed no effects and the first signs of injury appeared on sensitive species perhaps a hundred feet from the point of application. It thus appears that one should not be too hasty in deciding that "2,4-D couldn't have been the cause".

Our experience has shown that while oaks and ash are resistant to foliage exposure of 2,4-D, they are quite sensitive to exposure to vapors of 2,4-D during the dormant season. Tuliptrees, sassafras, wild black cherry and American elm are good indicator trees when 2,4-D is under suspicion. Garden crops in the vicinity, too, should be examined. Tomatoes, beans and melons respond readily to the herbicide by showing typical distortion. Cotton is perhaps the most sensitive of all crops. Snapdragons and zinnias, among common garden flowers, are known to show symptoms of exposure to 2,4 D quite readily. Ragweeds dandelions and plantain are injured or killed easily, and may be used as an aid in diagnosing tree troubles where 2,4-D was a factor.

Unfortunately, not much is known about the care that should be given to trees suffering from overdosages or mis-use of 2,4-D. Trees may be expected to overcome mild cases of curling or distortion of leaves or even some twig injury due to direct spray drift or to vapor drift. Since these chemicals break down rapidly in the soil, mild symptoms or response to absorption through the roots need not be alarming if the danger is recognized and further soil applications are withheld.

The custom operator, or the tree expert, needs to be acquainted with these symptoms and diagnostic procedures, since it is a much more prevalent "disease" than is generally known. Furthermore, with increasing use of hormone-type herbicides, such injury is likely to be a factor for some time to come. There is also an element of self-defense involved, for tree men should not be tagged as responsible for tree injury when the damage may have been caused from attempts at weed control by someone else. It is too frequently much easier to believe that the trouble was caused by work done on a tree last week, rather than to look for the cause in acts of last month, last year, or on an adjoining property some length of time back.

A World of
DEPENDABILITY
In Cooper Products
COOPER
DEPENDABLE
PRODUCT
Finest Emulsions of
TOXAPHENE
ALDRIN • DIELDRIN • CHLORDANE • DDT • BHC
Backed by
108 Years of Quality & Service
Wm. Cooper & Nephews, Inc.
1909 Clifton Avenue • Chicago 14, Illinois
Established 1843
Formulators • Processors • Packagers • Branches Throughout the World
Cooper Delivers the Goods • No Order Too Big or Too Small!

NOPCO* 1219-A EMULSIFIER

—for liquid insecticides that are all-out killers

Insecticide formulations that can be applied as liquids are proving not only more easy to use and less wasteful, but most *efficient as killers.*

You'll find Nopco 1219-A our specifically developed emulsifier for Toxaphene, Chlordane, BHC and Aldrin gives concentrates that are *unsurpassed.*

Consider these outstanding advantages:

GOOD EMULSIFIABILITY: Nopco 1219-A is a 100% active blend of chemicals that gives a very high degree of emulsifiability of Toxaphene, Chlordane, BHC and Aldrin.

ANTI-CORROSIVE PROPERTIES: Nopco 1219-A has the unique property of inhibiting deterioration of concentrates packaged in metal containers—a valuable factor when drum linings become chipped in transit.

HARD AND SOFT WATER RESISTANCE: Compounding with Nopco 1219-A assures both hard and soft water emulsion stability—with effectiveness up to 2000 p.p.m. of hardness.

STABILITY: Insecticides compounded with Nopco 1219-A are highly stable to acidity of the toxicants when in concentrate form. And the versatility of Nopco 1219-A permits preparation of either quick-breaking emulsions or permanently stable emulsions.

LOW COST: The low cost of Nopco 1219-A permits economical production of superior, long-life insecticides that do a *quick* and *complete* job of pest elimination.

Full information, including formulas, is yours for the asking . . . and remember, our Technical Service stands ready to help you solve any specific insecticide formulation problems.

*Reg. U. S. Pat. Off.

NOPCO CHEMICAL COMPANY
Harrison . . . . . New Jersey

SERVING THE HEART OF THE NATION

KANSAS CITY

2, 4-D WEED KILLERS
2-4-5-T BRUSH KILLERS
CHLORDANE
DDT
TOXAPHENE
WARFARIN
FUMIGANTS

$avings in $hipping

INVESTIGATE NOW!

It's still not too late to build Your 1951 program around our services.

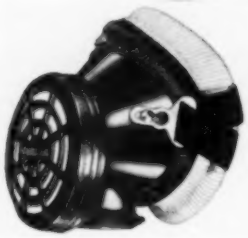
We Are Equipped To:

- Compound liquids or powders
- Automatically package
- Design and produce your labels
- Warehouse your product. (and)
- Make drop shipments.

Write us for particulars!

PRIVATE BRANDS, INC.
300 SOUTH 3RD ST., KANSAS CITY 18, KANSAS

PULMOSAN has the answer to your Breathing Hazards!



PULMOSAN RESPIRATORS

FOR DUSTS — MISTS — VAPORS

Consult us on your needs! Many specially designed models for nuisance and toxic dusts, including Parathion. Pulmosan Respirators are reliable, comfortable, easy-breathing, easily cleaned, very durable. Outline your hazard for recommendation.

Pulmosan Safety Equipment Corp.

644 PACIFIC ST., BROOKLYN 17, N. Y.
1831 FRANKLIN AVE., ST. LOUIS, MO.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

Positions Wanted:

Research — Development — Sales: Organic chemist with 3 years experience is petroleum field. Three years diversified experience in agricultural chemical field. Now in charge of promotional and sales activities for distributor handling four nationally known brands. Have application experience with herbicides, insecticides and paints. Desires position in research, development, technical sales or combination, with midwest manufacturer, who can use a man with new product ideas. Address Box No. 512, care of *Agricultural Chemicals*.

Agricultural Sales or Service: Currently employed chemist, 29, married, no children, draft exempt, desires to work with people rather than things. Personality and appearance suitable to sales work. B. S. in Agricultural Chemistry (University of Toronto). M. S. in Agricultural Biochemistry (Michigan State College). Strong general agriculture background. Teaching experience. Three years chemical research experience with fungicides and insecticides. Familiar with the latest agricultural pesticides. Location immaterial. Address Box No. 513, care of *Agricultural Chemicals*.

$10,000.00 & Field Representative Available: California. Agricultural graduate, young, background economic poisons, entomology, and related plant sciences plus sales aptitude and experience; plus higher accounting, general business administration training and experience; plus California agricultural field experience. Desires opportunity to invest and join some phase of agricultural chemicals, etc., or would consider representing manufacturer. Address Box No. 514, care of *Agricultural Chemicals*.

Artist: Layouts, lettering, spots, typography, production, etc. Seeks position in art or advertising department of a manufacturer. Also free lance. Address Box No. 515, care of *Agricultural Chemicals*.

Positions Open:

Wanted By Old Established Firm, man between the ages of 30 and 40 to headquarter in and travel the Midwestern territory on fertilizer materials. In replying give full details, references and indication of remuneration desired. Party experienced in this field having acquaintance and contacts with fertilizer manufacturers that area will be given preferred consideration. Address Box No. 509, care of *Agricultural Chemicals*.

Sales Staff Specialist Wanted: Purina Mills has an opening for a man 27 to 35 years of age to work as sales staff specialist in Agricultural Chemical Division. Practical background in insecticides and herbicides essential; must have sales personality, rural background helpful but not essential. College degree with major work in Entomology; some Botany and Chemistry useful. Experience in agricultural chemical sales desirable. Work involves helping develop and promote new products and assisting the sales department on special campaigns and programs. Considerable educational work on the use of new products. Also contacts with Production, buying, and advertising departments. Considerable platform work in handling fairly large audiences in group selling. Headquarters in St. Louis. Travel about one-third of time. Excellent opportunity with good salary and future. Address A. W. Moise, Purina Mills, Checkerboard Square, St. Louis 2, Missouri, giving age, draft status, and complete details.

Resident New England Salesman: Permanent position, agricultural chemicals; experience necessary; knowledge feed, seed, agricultural dealer, wholesale hardware trade. Address Box No. 510, care of *Agricultural Chemicals*.

Technical Sales Representatives: For reputable, national manufacturer of basic insecticides. Degree in entomology, biology or equivalent. Experiment station or other experience required. Texas, Carolina or central states territories. Address Box No. 511, care of *Agricultural Chemicals*.

ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist
(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)
ADVISER ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS
Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.
1118 Emerson Street
Palo Alto, California

Theodore Riedeburg Associates
Sales Consultants
and
Manufacturers' Representatives
on
Agricultural Chemicals
Sixty-third Floor, Chrysler Building
New York 17, New York
MUrray Hill 4-4731

CONSULTING ENTOMOLOGIST
Insecticides — Formulation
Plant Pathology—Research
Entomology—Legal Service
Author of
"Chemistry & Uses of Insecticides"
DR. E. R. de ONG
926 Stannage Ave. Albany 6, Calif.

ANALYSES - RESEARCH - DEVELOPMENT
Agricultural Chemicals, Insecticides, Fungicides, Herbicides, Fertilizers, & Hormones.
A complete Chemical service to manufacturers, compounders, sales agencies, and users of all types of agricultural chemicals. **Government specification analysis, testing and development—let us help you with your problems.** Modern scientific instruments—trained graduate chemists.
RAYMOND C. CRIPPEN
Research and Development Laboratories
Fleet St. & Central Ave., Baltimore 2, Md.
Request your copy of Bulletin No. 3

New S.C. Barrett Office

The Barrett Division, Allied Chemical & Dye Corporation, has announced the re-opening of its service office at Columbia, S. C., in the Carolina Life Building.

Service work in connection with "Arcadian," the American nitrate of soda, "A-N-L" brand fertilizer compound and other nitrogen materials distributed by Barrett for direct application in South Carolina will be handled through the Columbia office, as well as technical service for nitrogen solutions and mixed fertilizer production in the state.

Woodward & Dickerson Inc.

FERTILIZER AND FEED MATERIALS
Established 1873
BROKERS IMPORTERS
COMMISSION MERCHANTS EXPORTERS
Phone, wire or write for quotations
1400 South Penn Square Philadelphia 2, Pa., U. S. A.
Cable Address: "WOODWARD" Phone: LOcust 4-3688

Attention:

ORCHARD SUPPLY
DEALERS and JOBBERS

Big opportunity for EXTRA business and profit from *present customers* by handling M.S.A. Farm Spray Respirators which have the acceptance of the U.S. Inter-Departmental Committee on Pest Control. Government and manufacturers both urge use of respirators in processing and applying Parathion and other organic phosphates; rich, ready-made market is waiting. No new salesmen or sales contacts required; your present customers are your best respirator prospects. Every sale means automatic repeat business and profits on filters and cartridges. Many areas virtually unworked—first real, aggressive sales drive will skim the cream. M.S.A. means tops in protection on every safety item; equipment developed in World's largest research laboratory devoted exclusively to Safety. Write, wire or phone for full price and product information.

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STS., PITTSBURGH 8, PA.
At Your Service
54 BRANCH OFFICES IN THE UNITED STATES & CANADA

VELVEX
KAOLIN CLAY
For Use in Extending Insecticidal Materials

- Non-Abrasive
- Small Particle Size
- Chemically Adaptable
- Good Adhesive Qualities

For information and samples, write:

SOUTHEASTERN
CLAY COMPANY
AIKEN, SOUTH CAROLINA

"COHUTTA"
POWDERED TALC
An excellent carrier for insecticides and fungicides. Produced by
Cohutta Talc Co.
Dalton - - - Georgia

Do you have a Personal Subscription to
AGRICULTURAL CHEMICALS
There are numerous coming articles you will want to keep for your own. Why not enter your personal subscription today, if you've not already done so. One year for $3, two years $5, in the U. S.
AGRICULTURAL CHEMICALS
254 W. 31st St. New York 1, N. Y.

Advertisers' Index

Accessories Manufacturing Co. 111
Aluminum Company of America 20
American Cyanamid Co. 62
Andrews, W. R. E. 123
Antara Products, Inc. 82
Arkansas Rice Growers Ass'n 48
Arkell and Smiths Co. 69
Armour & Co. 92
Ashcraft-Wilkinson Co. 27, 64
Atlas Powder Co. 8
Attapulgus Clay Co. 4

H. J. Baker & Bro. 50
Bagpak Division, International Paper Co. 26
Baughman Mfg. Co. ..... Jan.
John Bean Div. 91
Bemis Bro. Bag Co. ..... 3rd Cover
Benjamin C. Betner 24
Bradley & Baker ..... Feb.

California Spray Chemical Corp. 98
Carolina Pyrophyllite Co. 113
Carbide & Carbon Chemicals Division
Union Carbide & Carbon Corp. 78
Chase Bag Co. 46
Chemical Construction Corp. ..... Feb.
Chemical Corporation of Colorado
9, 10, 1 -, 15, 16
Chipman Chemical Corp. 119
W. A. Cleary Corp. ..... Jan.
Cahutta Talc Co. 128
Colloidal Products ..... Feb.
Combustion Engineering-Superheater,
Inc. 71
Commercial Solvents Corp. ..... Feb.
Cooper, William & Nephews, Inc. 125
Cox, Dr. Alvin J. 127
Crippen, Raymond C. 127

Davison Chemical Corp. ..... Feb.
De Ong, Dr. E. R. 127
Dickerson Co. ..... Feb.
Dow Chemical Co. ..... Feb.

E. I. duPont de Nemours & Co. 76
Eston Chemicals, Inc. ..... Feb.

Floridin Co. 88
Food Machinery Corp., John Bean Div. .. 91
Fulton Bag & Cotton Mills 73

Gallowhur Chemical Corp. ..... Feb.
Geigy Co., Inc. 67

Hammond Bag & Paper Co. 23
Heckathorn & Co. 124
Hercules Powder Co. ..... 4th Cover
Hercules Steel Products Co. 97
Highway Equipment Co. 21
Huber, J. M. Co. 101
Hurst Industries, Inc. ..... Feb.
Hyman, Julius & Co. 74

Industry Publications 103
Innis, Speiden & Co. 124
Int'l Minerals & Chemical Corp. 66
International Mutoscope Corp. ..... Feb.

Kalker Chemical Works. 18
Koppers Company, Inc. 115
Kraft Bag Co. ..... Feb.

Linck, O. E. Co., Inc. 117
Lion Oil Co. 72

Marietta Concrete Corp. 112
McLaughlin Gormley King Co. 118
Michigan Chemical Corp. 121
Mine Safety Appliances Co. 128
Monarch Mfg. Co. 113
Monetta Clay Corp. ..... Jan.
Monsanto Chemical Co. 80, 86
Mulsimo Products, Inc. ..... Feb

National Agricultural Chemicals Assn. 102
Naugatuck Chemicals Division 58
Niagara Chemical Division ..... Feb.
Nopco Chemicals 146

Oberdorfer Foundries, Inc. 28

Pacific Coast Borax Co. 7
Penick, S. B. & Co. 6
Pennsylvania Industrial Chemical Corp. 106
Pennsylvania Salt Mfg. Co. 25
Pesticide Handbook 120
Phelps Dodge Refining Corp. 122
Phillips Chemical Co. 22
Pittsburgh Agr. Chemical Co. 70
Pittsburgh Plate Gluss Co. 112
Potash Co. of America 3
Poulsen & Co., A. E. 19
Powell, John & Co. ..... 2nd Cover
Prentiss Drug & Chemical Co., Inc. 104
Private Brands, Inc. 126
Pulmosan Safety Equipment Corp. 126
Pulverizing Machinery Co. 109

Raymond Pulverizer Div. 71
Riedeburg Associates, Theodore 127
Rohm & Haas Co. 94

Shell Chemical Corp. 100
Socony Vacuum Oil Co., Inc 66
Southeastern Clay Co. 128
Spraying Systems Co. 124
Sprout-Waldron & Co., Inc. 105
Standard Agricultural Chemicals, Inc. 30
Stauffer Chemical Co. 108
Sturtevant Mill Co. 17

Tennessee Corp. 129
Texas Gulf Sulphur Co. ..... Feb.
Thompson-Hayward Chemical Co. 56
Tobacco By-Products & Chemical Corp. 54
Townsend, Dr. G. R. 127

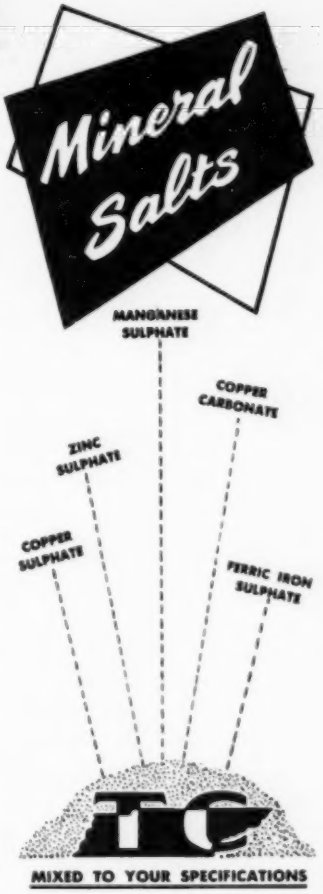
Union Bag & Paper Corp. 90
Union Carbide & Carbon Corp. Carbide
& Carbon Chemicals Division 78
United Clay Mines, Inc. 110
U. S. Industrial Chemicals, Inc. 52
U. S. Potash Company 96
U. S. Rubber Co. 58

Vanderbilt, R. T. & Co. 116
Velsicol Corp. 29
Virginia-Carolina Chem. Corp. 54

Willson Products, Inc. 84
Wisconsin Alumni Research Foundation Feb.
Woodward & Dickerson, Inc. 128
Woudhuysen, H. L. & Associates 114

Young Machinery Corp. 124

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)



MIXED TO YOUR SPECIFICATIONS

We are in a position to supply large or small orders of most any Mineral Salts mixtures.

One of the foremost producers of agricultural chemicals and soluble Mineral Salts.

★ COPPER SULPHATE
★ ZINC SULPHATE
★ MANGANESE SULPHATE
★ COPPER CARBONATE
★ FERRIC IRON SULPHATE

SULPHUR-DIOXIDE

For further information write the Tennessee Corporation, Grant Bldg., Atlanta, Georgia or Lockland, Ohio.

TENNESSEE TC CORPORATION

Tale Ends . . .

The March 15th Gettysburg Address

ONE-score and 17 years ago our fathers brought forth upon this nation a new tax, conceived in desperation, and dedicated to the proposition that all men are fair game.

Now we are engaged in a great mass of calculations, testing whether that taxpayer, or any taxpayer so confused and so impoverished, can long endure. We are met on Form 1040. We have come to dedicate a large portion of our income to a final resting place with those men who here spend their lives that they may spend our money.

It is altogether anguish and torture that we should do this. But in the legal sense we cannot evade—we cannot cheat—we cannot underestimate this tax. The collectors, clever and sly, who computed here, have gone far beyond our power to add and substract.

Our creditors will little note nor long remember what we pay here, but the Bureau of Internal Revenue can never forget what we report here. It is for us taxpayers to be devoted here to the tax return which the government has thus far so nobly spent. It is rather for us to be dedicated to the great task remaining before us; that from these vanished dollars we take increased devotion to the few remaining; that we here highly resolve that next year will not find us in a higher income tax bracket. That this taxpayer, underpaid, shall figure out more deductions, and that taxation of the people, by the Congress, for the government, shall not cause our solvency to perish from the earth.—*Anonymous.*

•

A stowaway bug which arrived in the U.S. recently on the coat collar of orchestra conductor Serge Koussevitsky, proved to be a rare crop pest, *larmus turbinatus*, which infests artichokes in France and Italy, according to Charles E. Post, U.S.D.A. entomologist to whom the insect was sent. Koussevitsky recently returned to the U.S. by plane, and the bug had apparently come along for the trip. Entomologists say that this is the first specimen to turn up in the U.S. in two years.

•

Abraham Lincoln, although not ordinarily remembered as an agriculturist, would probably favor the efforts of the agricultural chemical industry to provide pesticides and fertilizers for greater yields per acre. Such a guess has reasonably strong backing when one recalls a Lincoln quotation: "Every blade of grass is a study; and to make two grow where there was but one, is both a profit and a pleasure".

•

Prospects for a special train to the April meeting of the NAC in Miami Beach seemed remote at press time. Approximately 200 reservations were necessary to interest the railroad, and it has, to date, proved impossible to assure this number. Instead, several special cars would be used on one of the regular trains.

Can't miss . . .

IF YOU want your advertising message to reach the people in industry who control buying policies, there is no more direct or effective means than through the pages of the business press. Not only direct and effective, but at low cost with minimum waste. Specifically, if you want to reach those who control buying policies in the field of chemicals for agriculture, you CAN'T MISS if you advertise regularly in

AGRICULTURAL CHEMICALS

254 WEST 31st STREET NEW YORK 1

Fertilizer is Wearing a New Dress...

Do customers want to buy fertilizer in good quality, high-count cotton sheeting bags that have home sewing and other secondary uses?

You're mighty right, they do. They're glad to pay the small difference.

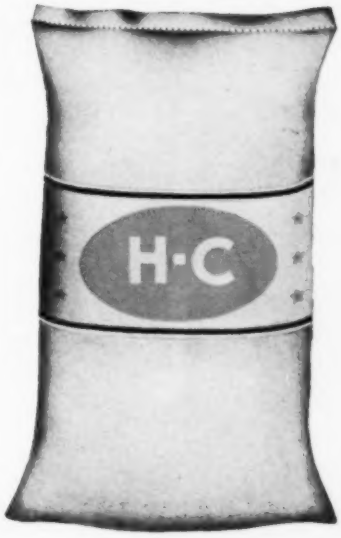
Bemis tried it out with fertilizer companies in Southern markets and customers switched in droves to fertilizer packed in the new Bemis H-C (high-count) Sheeting Bags. Now the biggest manufacturers are packing in them. And they're going country-wide.

Besides the valuable secondary uses, Bemis H-C Bags have these advantages:

- ★ They are attractive, attention-getting merchandisable packages.
- ★ Bemis Band-Label (white paper) shows your brand in crisp, bright colors . . . and your analysis and ingredients can be printed or stencilled on locally.
- ★ Sifting is minimized.
- ★ Dealers have few or no returned bags . . . customers want to keep 'em because they're getting goods at about one-third the store cost.
- ★ Customers like the easy way the fertilizer washes out.

ASK YOUR BEMIS MAN FOR THE COMPLETE STORY AND A SAMPLE BAG . . . OR SEND THE COUPON.

Bemis H-C (HIGH-COUNT) Sheeting Bags!



Bemis

BEMIS BRO. BAG COMPANY

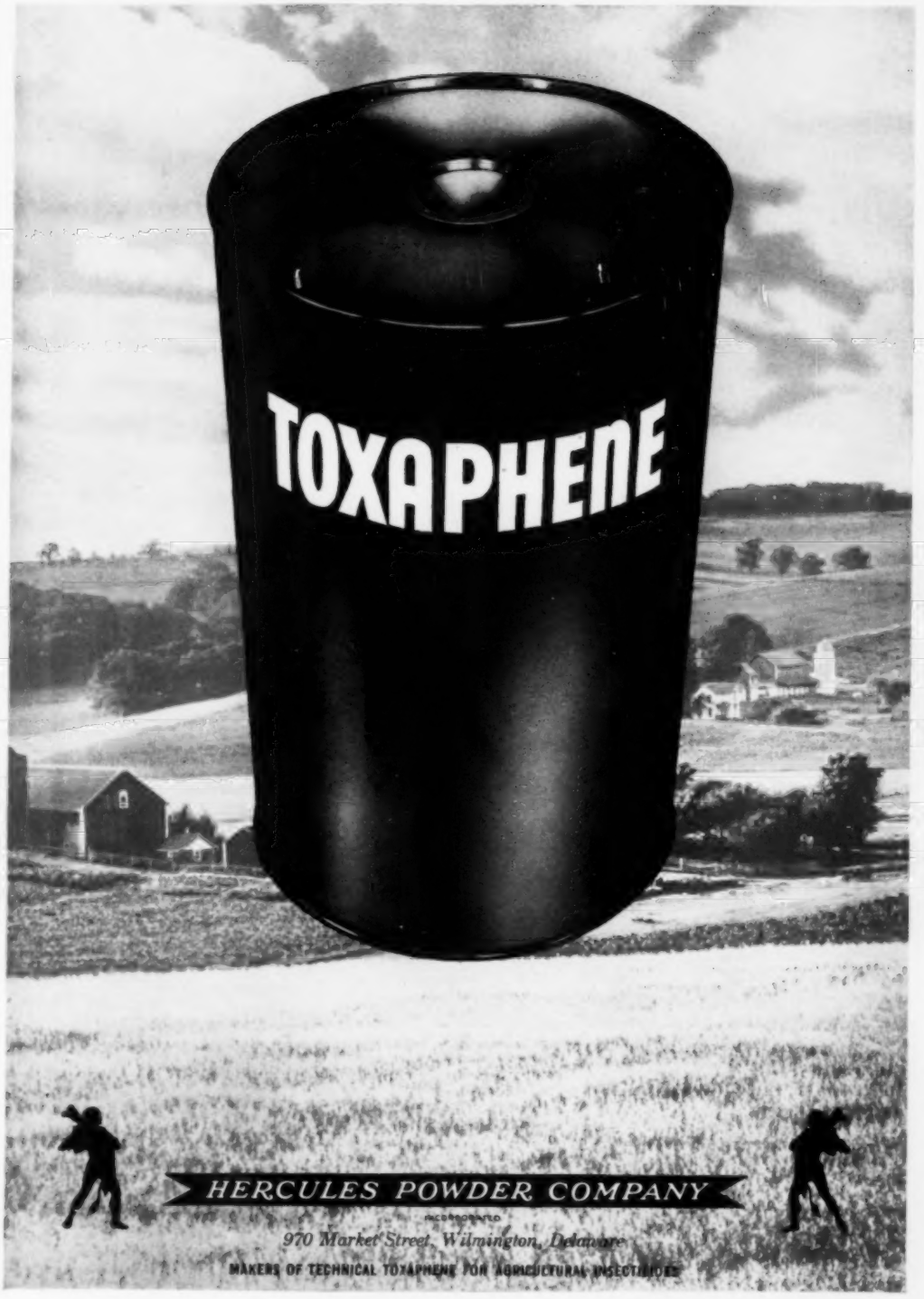
BEMIS BRO. BAG CO.
408-N Pine St., St. Louis 2, Mo.

Send complete information about Bemis H-C (high-count) Sheeting Bags for Fertilizer and also a sample bag.

Name_____

Address_____

City_____ State_____


TOXAPHENE
HERCULES POWDER COMPANY
INCORPORATED
970 Market Street, Wilmington, Delaware
MAKERS OF TECHNICAL TOXAPHENE FOR AGRICULTURAL INSECTICIDES